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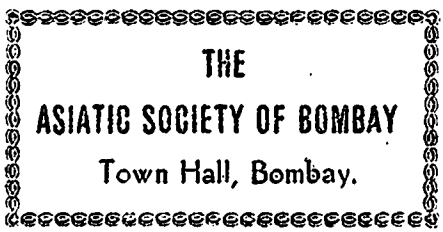

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A REVIEW

OF

BERKELEY'S THEORY OF VISION,

DESIGNED

TO SHOW THE UNSOUNDNESS

OF

B 1746

THAT CELEBRATED SPECULATION.

BY SAMUEL BAILEY,

AUTHOR OF ESSAYS ON THE FORMATION AND PUBLICATION OF OPINIONS, &c.

"Etenim supervacuus foret in studiis longior labor, si nihil liceret melius invenire præteritis." QUINT. INSTIT., lib. iii, cap. vi.

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CONTENTS.

Page

INTRODUCTION 1

CHAPTER I.

SUMMARY STATEMENT OF BERKELEY'S THEORY..... 13

CHAPTER II.

EXAMINATION OF BERKELEY'S DOCTRINE ON THE PERCEPTION OF OUTNESS AND DISTANCE 15

Sect. 1. On perceiving Objects to be External..... 18

2. On perceiving Objects to be Distant..... 35

3. Continuation of the Subject..... 50

4. Continuation of the Subject..... 57

5. Continuation of the Subject..... 67

6. Continuation of the Subject..... 81

7. Continuation of the Subject..... 95

8. Continuation of the Subject..... 105

CHAPTER III.

EXAMINATION OF BERKELEY'S DOCTRINE ON THE PERCEPTION OF MAGNITUDE 118

CHAPTER IV.

EXAMINATION OF BERKELEY'S DOCTRINE ON THE PERCEPTION OF FIGURE 132

CHAPTER V.

EXAMINATION OF EXTERNAL FACTS, NOT ADVERTED TO BY BERKELEY, BEARING ON THE THEORY OF VISION 148

Sect. 1. On the Power of Visual Perception, manifested by the Young of the Lower Animals and of the Human Race 149

Page

Sect. 2. On the Development of the Senses of Sight and Touch in the Young of the Human Race 158

3. On the Visual Perceptions of Persons relieved from Blindness: Case related by Cheselden 166

4. Continuation of the Subject: Case of Wm. Stiff, related by Sir E. Home 184

5. Continuation of the Subject: Cases related by Ware, Home, and Wardrop 193

6. Continuation of the Subject: Case of a Lady related by Mr. Wardrop 203

7. Further Reflections on the preceding Cases 211

CHAPTER VI.

ON THE ORIGINALITY OF BERKELEY'S THEORY 225

CHAPTER VII.

CONCLUSION 237

WORKS BY THE SAME AUTHOR.

ESSAYS ON THE FORMATION AND PUBLICATION OF OPINIONS, and on other Subjects. Third Edition, 8vo.

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INTRODUCTION.

THE doctrine contained in "an Essay towards a new Theory of Vision," which was first published in 1709 by the celebrated Bishop of Cloyne, seems to have become the established creed of philosophers almost from the moment of its appearance. In the last century, Hartley, Reid, Adam Smith, Condillac, Voltaire, Dugald Stewart (not to mention less eminent authors), all in succession adopted, extolled, and enforced it; and a further proof of its extensive prevalence is furnished by the sanction more or less explicit, which it met with from such writers as Diderot, Buffon, and D'Alembert.

To show the high estimation in which Berkeley's theory has been generally held, it is only necessary to quote the words of two of the eminent metaphysicians just named. Adam Smith, in his Essay on the Sense of Seeing, pronounces it to be "one of the finest examples of philo-

sophical analysis that is to be found, either in our own or in any other language." Dugald Stewart terms it, "one of the most beautiful and at the same time one of the most important theories of modern philosophy*;" and in other passages where he has occasion to speak of it, he uniformly mentions it as universally admitted by philosophers in the present day, and as a theory which he supposes no one would now be inclined to dispute. "The solid additions," he says in one place, "made by Berkeley to the stock of human knowledge, were important and brilliant. Among these, the first place is unquestionably due to his *New Theory of Vision;* a work abounding with ideas so different from those commonly received, and at the same time so profound and refined, that it was regarded by all but a few accustomed to deep metaphysical reflection, rather in the light of a philosophical romance than of a sober inquiry after truth. Such, however, has been since the progress and diffusion of this sort of knowledge, that the leading and most abstracted doctrines contained in it, form now an essential part of every elementary treatise on optics, and are

* Elements of the Philosophy of the Human Mind, vol. i, p. 415.

adopted by the most superficial smatterers in science as fundamental articles of their faith*."

The theory, however, did not escape the attack of adversaries. Soon after the death of the author, it was called in question by Dr. Porterfield in his Treatise on the Eye†, but with no great success: his observations, although they contain the germs of one or two good arguments, being on the whole vague and obscure.

Condillac also contested the validity of the theory, in his Essay on the Origin of Human Knowledge, published in 1746‡, but a few years after the appearance of that work he became a convert to Berkeley's views; and in his Treatise on Sensations unreservedly retracted his former opinions.

More recently the theory has been taken in hand by physiologists both adverse and friendly. It has been assailed particularly by Dr. Gall§ and his followers, both here and on the Continent, some of whose arguments are solid and forcible: while on the other side, it has been adopted by

* Dissertation on the Progress of Metaphysical Philosophy, p. 164.

† Vol. ii, p. 301, et seq.

‡ Part i, sect. 6.

§ Sur les Functions du Cerveau, tome premier, p. 87.

Magendie *, Müller †, and others in France and Germany: and our English physiologists, excepting such as are professedly phrenologists, seem in general to have acquiesced in its soundness. Thus Dr. Bostock ‡ considers it as clearly demonstrated, Dr. Roget § as completely confirmed, and Mr. Mayo ‖ speaks of it in the same tone. By our latest writers on Metaphysical Philosophy the theory has been also explicitly maintained: amongst others by Dr. Thomas Brown ¶, Dr. Young** of Belfast, Mr. Mill ††, and Mr. Whewell ‡‡ in a work published since the present treatise was written. The testimony of the last named philosopher, as the most recent, deserves to be quoted. "The opinion," he says, "above illustrated, that our sight does not give

* Compendium of Physiology, translated by E. Milligan, M.D., p. 55.

† Elements of Physiology, translated by W. Baly, M.D., § 1083.

‡ An Elementary System of Physiology, vol. iii, p. 120.

§ Animal and Vegetable Physiology, vol. ii, p. 520.

‖ Outlines of Human Physiology, 2d edit., p. 363, et seq.

¶ Lectures, vol. ii, p. 65.

** Lectures on Intellectual Philosophy, p. 113.

†† Analysis of the Human Mind, vol. i, p. 73.

‡‡ Philosophy of the Inductive Sciences, vol. i, p. 113 and p. 276.

us a direct knowledge of the relations of solid space, and that this knowledge is acquired only by an inference of the mind, was first clearly taught by the celebrated Bishop Berkeley, and is a doctrine now generally assented to by metaphysical speculators."

It was no idle wish to try a metaphysical encounter with the acute and accomplished Bishop of Cloyne, which prompted me to undertake the labour of a minute examination of his celebrated Theory. Many years ago I held what may be styled a derivative opinion in its favour, but having in the course of a philosophical discussion had occasion to explain it, I found on attempting to state in my own language the grounds on which it rested, that they no longer appeared to me so clear and conclusive as I had fancied them to be. When I was driven back on the merits of the question without being able to recollect the precise form in which Berkeley had clothed his arguments, and by which he had given his doctrines so plausible an air, the weak points of the theory became in some degree manifest. Having my attention, however, at that time occupied with other subjects, the accidental interest I felt in the matter passed from my mind, and I contented myself with holding the

theory as doubtful and to be investigated as opportunity might offer. More recently, while engaged in studying with particular attention the Association of Ideas, Berkeley's theory necessarily came again under my review, and as I could not well proceed in my design without thoroughly sifting it in connection with that part of mental philosophy, I determined to make it the subject of a patient and dispassionate examination. The result has been a clear conviction in my own mind of its erroneousness, and a desire to state to the philosophical world the grounds on which that conviction has been formed. In the course of putting these into a methodical shape I have, I own, been repeatedly staggered by the very positive language in which the theory has been asserted, and the sort of contempt with which all persons, past, present, and future, falling short of full acquiescence in it, have been treated or threatened.

Mr. Stewart, for instance, in reference to Condillac's first opinion, uses the following language, quite sufficient to make any dissentient tremble in his heresy:

"It is difficult to suppose that a person of mature years, who had read and studied Locke and Berkeley, with as much care and attention

as Condillac appears to have bestowed on them, should have reverted to *this ancient and vulgar prejudice*, without suspecting that his metaphysical depth has been somewhat over-rated by the world."—"Nothing," adds Mr. Stewart, "short of his own explicit avowal could have convinced me, that a writer of so high pretensions and of such unquestionable ingenuity as Condillac, had really commenced his metaphysical career under *so gross and unaccountable a delusion**." Such passages have filled me with frequent self-distrust, and remanded me again and again to the reconsideration of my own views; but notwithstanding this strong language in behalf of the theory, and the philosophical stigma thus branded on any departure from it, I have always returned from the inquiry with a confirmed impression of the erroneousness of Berkeley's doctrine, and a still clearer apprehension of the nature of the mistake on which it proceeds.

Against the denouncements of Mr. Stewart, we may set one or two considerations for the encouragement of those who labour under the "ancient and vulgar prejudice" that he treats with such unmeasured scorn. They may gather

* Dissertation on the Progress of Philosophy, p. 165.

some confidence in dissenting from any opinions originating with the Bishop of Cloyne, from reflecting on the peculiar character of his mind. Remarkably subtile and ingenious, accomplished in various learning, elegant in taste and plausible in style, he yet scarcely touched a subject without manifesting a *comparative* deficiency in depth and solidity of understanding. His Treatises on Tar Water alone form an imperishable monument of the range of his knowledge, the acuteness of his intellect, the fertility of his invention, and the unsoundness of his judgment*. He was just the man to push a theory to its utmost extreme without being startled by the extravagant consequences which send sedater philosophers back to a renewed examination of their premises and the first steps of their reasoning. Nor is it to be overlooked as constituting an external ground for distrust, that his Theory of Vision was produced at the early age of twenty-five;

* In addition to the amusing instances, furnished by Berkeley himself, of the way in which he carried out a favourite hypothesis, another is mentioned by one of his successors, Bishop Bennett, who relates that at Cloyne "there is a hedge of myrtles six feet high planted by Berkeley's own hand, and which had each of them *a large ball of tar put to their roots*."—Works of Dr. Parr, vol. vii, p. 107.

and although it was confirmed by his maturer judgment, yet even this consideration is little in its favour, as the immediate success of his first essay may be presumed to have encouraged him in that strain of paradoxical speculation in which he had early become so great an adept.

Such a mind has often great influence on men of soberer and even profounder intellects, who when struck at first with the speciousness of a doctrine take pains rather to illustrate its conclusions than to examine its foundation. It is only in this way, that I can account for the unhesitating adoption of the theory by such men as Reid, Smith, and Stewart. It is less to be wondered at that it was embraced by Dr. Thomas Brown, because he had a genius kindred to that of Berkeley in metaphysical subtilty, and delighting like his in the exercise of its ingenuity in speculations, the solidity of which seemed to become as they proceeded,

"Fine by degrees and beautifully less."

While some philosophers may regard, with Mr. Stewart, all objections to the theory of Berkeley as attempts to revert to "an ancient and vulgar prejudice," readers in general will probably consider the writer as having taken unnecessary pains to prove so plain a fact as that we really perceive

objects to be at various distances with our eyes; of which most people are already sufficiently convinced, and which, at all events, requires no elaborate demonstration.

An objection, however, of this sort has obviously been forestalled by the passages above quoted, where our first philosophers have expressed their full concurrence in Berkeley's theory. If that theory, then, is really erroneous, the circumstance of its being maintained and extolled by men of the highest eminence, renders it important to prove it so. A false doctrine placed at the very entrance of intellectual philosophy by the greatest adepts in it, must present a formidable obstacle to comprehensive and accurate views of the whole subject. The existence of such an error seems incompatible with precision of thinking on dependent and kindred topics, and with a correct analysis of the human mind. To the perfection, moreover, of any department of science, it is essentially requisite that all errors in it, however inconsequential and insignificant in themselves, should be swept away.

If this necessary work, then, is to be done in regard to the instance before us, it is better that it should be thoroughly done. A mere cursory treatment would be insufficient to subvert an

error (assuming it to be one) so long established as this, and upheld by such authorities as have lent it their support. To borrow the language of Berkeley himself, "Where there is so much prejudice to be encountered" (and *that* we must recollect not of the vulgar, but of the learned and philosophical), "a bare and naked demonstration of the truth will scarce suffice *."

Nor will an elaborate examination be altogether fruitless in other respects. The overthrow of a false theory, in proportion as it is fundamental and complete, furnishes a useful illustration of the modes in which the understanding is liable to swerve from the path of truth, and lessens the chances of future deviation. In reference to the light which, in the present case, it may be the means of letting in upon some of those phenomena of our mental constitution which have been obscured by the prevalence of the error, we may add that such a result may be the more confidently looked for, inasmuch as the subject occupies, in reality, a most important as well as interesting position, being situated on the border-land where Physiology and the Philosophy of the Human Mind meet and mingle; touching, on one side, the modern discoveries respecting the nerves and brain, and on the

* Theory of Vision, sect. 138.

other the metaphysical doctrines regarding perception, abstraction, and association; and embracing a multitude of interesting facts (such as the phenomena attending restored vision) to the interpretation of which both sciences are required to lend their assistance.

After all, nevertheless, I will not insist that I have not expended more labour on the question than, considered in itself, it is worth. The main part of it, however, was necessarily bestowed, as already mentioned, for the satisfaction of my own scruples and the clearing up of my own views previous to ulterior researches; and probably the result of it, here exhibited, may relieve other inquirers, equally disinclined to admit without scrutiny ingenious and paradoxical theories, from the same perplexity, while it saves them from similar toil; since between the trouble of passively following an investigation of this sort when accomplished, and that of originally working it out, there is an almost immeasurable difference. It may be added, that for the ease of the reader the present treatise, large as it may seem for the subject, has been reduced, by the retrenchment of unessential matter and the compression of what remained, to about one half of its original bulk.

CHAPTER I.

SUMMARY STATEMENT OF BERKELEY'S THEORY.

THE Theory, which we have here to examine, embraces the perception of Outness, Distance, Magnitude, and Figure.

It will be found by the attentive inquirer, that the theory varies in some respects, and is mixed up with divers speculations, more or less pertinent, as it is unfolded by its author in the explanation of these several perceptions; so that to understand it accurately and fully, it must be considered separately in reference to each.

Hence, too, it is difficult to present a correct and complete general view of it in a few words intelligible to those who have not studied it in detail. The following is an attempt to do it in the plainest language of which the subject admits.

Outness, Distance, Real Magnitude, and Real Figure, are not perceived (according to the theory) immediately by sight; but, in the first place, by the sense of feeling or touch: and it is

from experience alone that our visual sensations come to suggest to us these exclusively tangible properties. We, in fact, see originally nothing but various coloured appearances, which are felt as internal sensations; and we learn that they are external, and also what distances, real magnitudes, and real figures, these coloured appearances indicate, just as we learn to interpret the meaning of the written characters of a language. Thus a being gifted with sight, but destitute of the sense of touch, would have no perception of outness, distance, real magnitude, and real figure. Such is Berkeley's doctrine, stated in the most general terms.

As we proceed in the examination, a fuller explanation of each part of the theory will be entered into. I shall first consider it in reference to outness and distance; afterwards in reference to magnitude and figure.

CHAPTER II.

EXAMINATION OF BERKELEY'S DOCTRINE ON THE PERCEPTION OF OUTNESS AND DISTANCE.

BERKELEY gives the following abstract of his Theory of Vision, as far as it regards outness and distance, and since it contains the principal features of the theory in a succinct form, the reader may find it useful to have the passage before him, although it will by no means supersede the necessity of resorting to the fuller exposition to which it refers. Speaking of his Essay on that subject he says, "wherein it is shown that distance or outness is neither immediately of itself perceived by sight, nor yet apprehended and judged of by lines and angles, or any thing that hath a necessary connection with it: but that it is only *suggested* to our thoughts, by certain visible ideas and sensations attending vision, which in their own nature have no manner of similitude or relation, either with distance or things placed at a distance. But by a connection taught us by experience, they *(viz. visible ideas and visual sensations)* come to signify and suggest them (*viz. distance and things placed at a distance*) to us, after the same manner

that words of any language suggest the ideas they are made to stand for. Insomuch that a man born blind, and afterwards made to see, would not at first sight, think the things he saw to be without his mind, or at any distance from him *." To complete this summary exposition of his own theory on this point, Berkeley should have added that the distance or outness suggested to our thoughts by visual sensations, can have become known to us only through the sense of touch.

It may be remarked by any one who will be at the trouble of attentively examining this explanation of the Theory of Vision by its celebrated author, or the larger exposition contained in the Essay on the subject, that he mixes together two separate questions, as if he were either unaware of any difference between them, or regarded them as admitting of the same answer. Whether objects are seen to be external, or at *some* distance †, is one question

* A Treatise concerning the Principles of Human Knowledge, sect. 43.

† It will be shown in a subsequent section, that these two expressions are virtually identical, or in other words that seeing objects to be external implies seeing them to be at some distance; meanwhile we may limit our attention to the first.

altogether distinct from the inquiry whether objects are seen by the unassisted vision to be at *different* distances from the percipient: and yet Berkeley uniformly assumes them to be the same, or at least takes it for granted that they are to be determined by the same arguments.

The two inquiries, nevertheless, are so far from being identical, that a philosopher may with perfect consistency hold that objects are immediately seen to be external while entertaining the opinion that they are not originally seen at different distances; and of those writers who have maintained the Berkeleian theory of vision, few, if any, have given the slightest attention to the former of these questions, or even conceived that it was at issue. Mr. Stewart, for example, in explaining the Berkeleian theory, says that the sense of sight "prior to experience conveys to us the notion of extension in two dimensions only *," assuming, therefore, that it conveys to us the notion of outness, for in another place he maintains that whatever "involves the notion of extension" necessarily involves the notion of externality †.

* Elements, vol. i, p. 147. † Phil. Essays, p. 153.

SECTION I.

ON PERCEIVING OBJECTS TO BE EXTERNAL.

In conformity with the distinction just drawn, let us examine, in the first place, how far the arguments adduced by this eminent writer tend to prove that objects are not immediately perceived to be external by the sight; or, in the language of Berkeley, that outness is not immediately of itself perceived by sight.

On turning for this purpose to Berkeley's Essay, we find literally no arguments which specifically apply to this particular question; nothing but bare assertion repeated in various phrases. Up to the 41st section, he has been endeavouring to show how we come to judge of distances or degrees of distance by the sight. All the considerations he adduces bear on the latter point (with what success will be hereafter examined), and have no tendency whatever to prove the proposition now under review. In the section just mentioned, however, he for the first time distinctly asserts "that our judging objects to be at any distance, or *without the mind*, is entirely the effect of experience," and appears to consider that he has been all along engaged in

proving this proposition. "From what hath been premised," says he, "it is a manifest consequence that a man born blind being made to see, would, at first, have no idea of distance by sight; the sun and stars, the remotest objects, as well as the nearer, would all seem to be in his eye, or rather *in his mind.* The objects intromitted by sight, would seem to him (as in truth they are) no other than *a new set of thoughts or sensations*, each whereof is as near to him as the perceptions of pain or pleasure, or the most inward passions of his soul."

As Berkeley thus produces no specific arguments in proof of his doctrine concerning outness, and as he evidently considered that his explanation of the manner in which we come to judge of different degrees of distance by the eye, shows also how we come to consider visible objects as external, all that we have to do is to examine his theory under this aspect, and his arguments in this particular application.

His explanation, as far as it is applicable to the perception of outness, by the eye, is simply this, that our visual sensations, or what we ultimately term visible objects, are originally mere internal feelings, and that we come to regard them as external objects from their suggesting

or reminding us of those tangible qualities with which we have by experience found them to be connected. Outness, he affirms, is not immediately of itself perceived by sight, but only *suggested* to our thoughts by certain visible ideas and sensations attending vision.

He thus, in fact, represents the visual perception of objects, as external, to be an instance of the association of ideas. If, however, he had more clearly analysed the process in question, he would have perceived the fallacy into which he had fallen. It is impossible that the law of mind, by which one thing suggests another, should produce any such effect as the one ascribed to it. Suppose we have an internal feeling A, which has never been attended with any sensation or perception of outness, and that it is experienced at the same time with the external sensation B. After A and B have been thus experienced together, they will according to the law of association suggest each other. When the internal feeling occurs, it will bring to mind the external one, and *vice versa*. But this is all. Let there be a thousand repetitions of the internal feeling with the external sensation, and all that can be effected will be that one will invariably suggest the other.

Berkeley's theory, however, demands more than this. He maintains, that because the internal feeling has been found to be accompanied by the external one, it will, when experienced alone, not only suggest the external sensation, but absolutely be regarded as external itself; or rather, be converted into the perception of an external object. It may be asserted, without hesitation, that there is nothing in the whole operations of the human mind analogous to such a process.

The illustration of his meaning, which Berkeley himself gives, will assist us in exposing the error of his doctrine. He tells us, in the passage already quoted, that by a connection taught us by experience, visible ideas and visual sensations come to signify and suggest outness to us, after the same manner that the words of any language suggest the ideas they are made to stand for.

This brings the question to a point. We know perfectly well how the sound of the word "rose" comes to suggest or raise up in the mind the idea of the absent flower: it is (in the simplest form of the process) from the name being heard at the same time that the flower is seen. The parallel case in reference to sight and touch would be, that after we have touched an object and seen it at the same time, what is perceived by the sight

comes to suggest what is perceived by the touch, and *vice versa*, in the absence of each other. But this is not the process which Berkeley represents as taking place, although he himself strangely enough fancied it to be so. According to him, an internal feeling and an external sensation having been experienced at the same time, the internal feeling, when it afterwards occurs, not only suggests the idea of the external object, but by so doing suggests the idea, or if I may use the figure, infuses the perception of its own externality. He thus attributes to suggestion an effect contrary to its nature, which, as in the case of language, is simply to revive in our conception what has been previously perceived by the sense. His comparison, therefore, completely fails. To make it tally, we must suppose that the audible name by suggesting the visible flower becomes itself a visible object.

But perhaps the most remarkable feature in his doctrine on this point remains to be noticed. He makes the perception of visible outness, as we have seen, a consequence of *suggestion:* outness, he asserts, is not seen, but only *suggested* to our thoughts. Now the process of suggestion can take place only when one of the objects is absent. When, for example, I see an orange without

handling it, the appearance may suggest its tangible properties; but when I both see it and handle it, suggestion has no place. The whole of the facts, in such a case, are that I experience two sets of sensations or feelings simultaneously. If, then, the perception of visible outness is owing to suggestion, it would follow that while I was both handling and looking at the orange, its visible figure would seem an internal feeling; but on quitting my hold the same visible figure would appear to be external.

As this is absurd, Berkeley ought to have distinctly ascribed the origin of the perception to simultaneous impressions. It is curious enough that he seems not to have been fully aware of this: it was a singular oversight not to remark the importance of the consideration, that if his theory respecting the indirect and mediate perception of visible outness were true, the effect would not be in the first instance from visible objects reminding us of tangible qualities, but from visual and tactual sensations being simultaneously experienced. Inasmuch as nothing can be found in suggestion not experienced when the two impressions are simultaneously felt, it would be these contemporal impressions that would first give us the perception of externality

in visible objects. In placing the origin in suggestion without adverting distinctly and specially to simultaneous perceptions, he has shown that he did not fully understand the bearings of his own theory. It is true, that he ascribes the establishing of the connection between the two impressions to experience, but he attributes the effect which is to be accounted for, to the subsequent revival of one by the other.

The theory, however, is not more tenable on this new ground. Experiencing two sensations or perceptions together, so far from tending to alter their nature or to convert them into each other, or to confound them in any way while they are actually felt, has rather the contrary effect of impressing us more distinctly with the whole extent of their difference, than we are apt to be impressed when one sensation only is felt and the other is a matter of recollection. On Berkeley's supposition, that the visible figure of the orange is at the outset only an internal feeling, what would take place, when I was both handling and looking at it, would be, that I should have a perception of its tangible properties simultaneously with this inward emotion: but the external sensation would have no more tendency to make the inward emotion seem

outward, than the latter to make the former appear inward. As well might it be contended, that the sight of a rose would convert the fragrance which we perceived at the same time into a visible quality, or that the fragrance would convert the bloom of the flower into a smell.

In the instance of language already adverted to, and adduced by Berkeley himself as a parallel case, when the sound of the name and the appearance of the object are perceived at one and the same time, neither of these perceptions is altered by the presence of the other. The two simultaneous impressions are no more changed than the original perception of the ear is altered when the audible name afterwards revives the conception of the object.

The argument may be summed up thus — Berkeley asserts, that the perception of external objects by sight, as such, is not immediate, but arises from visual sensations suggesting tactual perceptions, in consequence of a connection between the two taught us by experience. In this asserted process there are two stages to be remarked.

1. We learn from experience a connection between visual sensations and tactual perceptions; which can mean only that we have them or ex-

perience them at the same time, or in close succession.

2. After this experience, the former being felt alone, suggest the latter.

Now as the perception of objects as external by the sight is not according to the theory immediate or original, it must have its rise or commencement either in the first or in the second stage of the process. But the circumstance of impressions being experienced together by two senses has no tendency to alter their nature, or convert the impressions of one sense into those of another. The visual perception of outness cannot, therefore, commence at the first stage. Nothing is left, then, but for it to commence at the second; to take its rise, as Berkeley himself asserts, from suggestion. But when a present sensation suggests or brings to mind a past perception, it merely introduces an exact intellectual representation of it. What happens in the second stage nowise differs consequently from what happens in the first, except that a tactual *conception* takes the place of a tactual *perception;* and if the latter cannot alter a visual sensation, there are no grounds for supposing a mere copy of it can have that effect.

Inasmuch, therefore, as the visual perception

of external objects, as such, can take its rise neither in the first nor in the second stage of the process here described, it cannot be derived from the sense of touch, and there is no reason to suppose it otherwise than immediate and original.

Berkeley's prediction already quoted, that in the event of a man born blind being made to see, all objects would appear to be in his mind and seem to him no other than a new set of thoughts, has been supposed to have been fulfilled in the case of the boy couched by Cheselden. But how this case can have been supposed for a moment to lend any confirmation to Berkeley's doctrine on this particular point, seems wholly inexplicable. Cheselden's account says, that when the boy "first saw, he was so far from making any judgment about distances, that he thought all objects whatever *touched his eyes, as what he felt did his skin* *," which is clearly stating that visible objects appeared *external* even to his body, to say nothing of his mind †, just as tangible objects did. As far, therefore, as the account proves any thing, it places the sight and the

* Philosophical Transactions, 1728.

† Yet a recent writer on the Philosophy of the Human Mind represents Cheselden's patient as thinking that all the things he saw were *in* his eye. Lectures on Intellectual Philosophy, by John Young, LL.D., p. 113.

touch on an equality as to the perception of outness, and is directly hostile to Berkeley's hypothesis which makes one entirely dependent on the other. This celebrated narrative, and the value of the expression "touched his eyes," will be examined more closely in a subsequent part of the present essay, and it is consequently needless to dwell upon it here; but whoever takes the trouble of reading the original account will find that there is not a single circumstance recorded in it which corroborates the strange doctrine before us.

We think it has been sufficiently shown, that the considerations adduced by Berkeley utterly fail to establish his doctrine of what may be termed for brevity, the tactual origin of visible outness; and here the question might very properly be abandoned, inasmuch as the *onus probandi* clearly lies on those philosophers who attempt to prove the universal impressions of mankind to be fallacious, and if the attempt should not succeed, such impressions remain in all their authority.

It may be well, nevertheless, to glance at a few positive considerations tending to establish the proposition, that outness is just as much perceived by the sight as by the touch; or, in more accurate language, that when a picture is formed

on the retina, the object is *seen* to be external as directly and immediately, as the object is *felt* to be external when an impression is made on the skin or the muscles.

An actual proof of this is furnished, I apprehend, by many of the inferior tribes of animated beings. In the human infant the organs are so immature and undeveloped, compared with corresponding organs in the young of the former, that although, as I shall hereafter show, we may attain to sufficiently satisfactory conclusions from observing its movements, yet the evidence presented by the lower animals is undoubtedly more forcible. It is manifest by the actions of many of them, that they see external objects as soon as they are born, and before they can possibly have derived any assistance from their powers of touch or muscular feeling. The duckling makes to the water as soon as it has left its shell; the lamb moves about as soon as dropped. "The young turtles and crocodiles," says Sir Humphrey Davy, "hatched without care of parents, run to the water. The crocodile bites at a stick, if it be presented to it, the moment it is hatched *."

All these instances imply that external objects

* Life of Sir H. Davy, by John Davy, M.D., vol. ii, p. 80.

are seen to be so. There is no room for any possible process of learning by means of any other sense. They prove, at least, the possibility that the opening of the eye may be at once followed by the perception of external objects as such, or, in other words, by the perception or sensation of outness. There is manifestly in the lower animals an organ of sight, the use of which involves the perception in question; and there is absolutely no ground whatever for supposing that this, the most comprehensive of all our instruments of communication with the external world, has not in every species of animated beings the power in like manner of directly and instantly conveying to the brain an impression of the outness of those external objects, which to use Berkeley's language "it intromits."

From this physical evidence let us turn to a metaphysical consideration, perhaps to some minds equally satisfactory. On careful reflection it must, I think, appear to every one that the impression, or perception, or sensation (or whatever else we may name it) of outness is involved in the exercise of sight, if not of all our senses, just as much as it is in the exercise of the sense of touch. There is no more reason for ascribing this impression to the latter than to the former.

In analysing what happens in the case of

touch, which is supposed to have the privilege of yielding the perception in question to the exclusion of the other senses, we arrive in the last result at this, that certain tactual or muscular feelings are attended with it by the constitution of our nature. But if so, what greater difficulty is there in conceiving that sensations of sight are also attended with it in the same manner?

Berkeley insists, that there is no natural or necessary connection between visual sensations and the perception of outness: what natural or necessary connection, in any conceivable acceptation of those terms, is there between tactual sensations and the perception of outness which does not subsist between the two former? If there is any meaning at all in his assertion, it is just as correct in the one instance as in the other.

The truth is, that in both cases the perception of outness is a component part of the sensation, or a necessary condition of the sensation. We must begin by having it rise as a part of, or in connection with, some impression on the nerves; and it is just as easy to conceive it to be connected or identified with an impression on the nerves of vision, as with an impression on the nerves of touch. A substance is brought into contact with my hand, and immediately a certain effect is

produced on the nerves of touch, resulting in an impression on my mind that there is an external object. The same, or any other substance, is placed before my eyes, and immediately a certain effect is produced on the nerves of sight, also resulting in an impression on my mind that there is an external object.

It is quite plain that we can no more account for the first event than the second, or that we can equally account for both. Whatever explanation can be given of the former will equally apply to the latter.

If it be alleged that in the first case it is resistance, or the feeling of resistance, that gives the impression of an external object, the state of the question is not altered. What we term the feeling of resistance is owing to the muscles, and thence the nerves being put into a certain condition. Why, when they are affected in the manner implied in the expression "feeling of resistance," the perception of an external object should take place, is as difficult to apprehend and explain, as why the perception of an external object should take place when the optic nerve is put into the condition denoted by the phrase "an image painted on the retina." They are both facts of our organization.

In discussing the perception of outness separately from that of distances (subjects which Berkeley, as I have already remarked, treated together as if they were identical), it has been impossible to avoid introducing some considerations to which it will be needful again to advert with greater fulness in examining the latter subject. To enter thoroughly indeed into the first question would be to anticipate arguments more usefully applicable to the second, which amongst the philosophers of the present day is the only one actually in dispute. I have, therefore, contented myself with adducing in this place no more considerations than were absolutely required to clear the way for the subsequent discussions, leaving the reader to apply many observations, which will be hereafter advanced, to the subject of the present section.

It may be proper to notice here that the Theory of Vision, in which the author thus strenuously contends that outness can be perceived only by the touch and not by the sight, was written before he had entered upon those speculations in which he denied the existence of *all* objects without the mind; and the reader will accordingly remark, that throughout the essay he assumes the external existence of the

objects of touch. Afterwards, when he had emancipated himself from the last-mentioned vulgar error (to use his own epithet), it might naturally appear inconsistent in him to persist in the doctrine of our seeing things to be external by means of the touch, while he denied the externality of tangible objects themselves. He was sensible of the predicament in which he had thus placed himself, and endeavoured to extricate himself from it. Alluding to the Theory of Vision in a subsequent work, he thus explains the connection of his former with his later doctrine: "That the proper objects of sight," he says, "neither exist without the mind, nor are the images of external things, was shown even in that treatise. *Though throughout the same, the contrary be supposed true of tangible objects:* not that to suppose *that vulgar error* was necessary for establishing the notions therein laid down, but because it was beside my purpose to examine and refute it in a discourse concerning *vision.* So that in strict truth the ideas of sight, when we apprehend by them distance, and things placed at a distance, do not suggest or mark out to us things actually existing at a distance, but only admonish us what ideas of touch will be imprinted in our minds at such and

such distances of time, and in consequence of such and such actions. It is, I say, evident from what has been said in the foregoing parts of this treatise, and in sect. 147 and elsewhere of the Essay concerning Vision, that visible ideas are the language whereby the governing spirit, on whom we depend, informs us what tangible ideas he is about to imprint upon us, in case we excite this or that motion in our own bodies *."

SECTION II.

ON PERCEIVING OBJECTS TO BE DISTANT.

Having shown, in the preceding section, that outness is as directly perceived by the eye as by the touch; or, to vary the expression, that the visible equally with the tangible world appears external to the percipient, we must, at this stage of the argument, consider the theory under examination as representing, that we see all things originally in the same plane or equally near, and that it is by means of the touch alone we learn to see them at different distances. The

* Treatise concerning the Principles of Human Knowledge, sect. 44.

various appearances which objects present to the eye, together with certain sensations attending the use of the organ, being connected by experience with tactual perceptions of space, become, according to the theory, indicative of the various degrees of proximity at which the objects are situated, and the association is so close that we actually acquire the faculty of discerning by the sight what had in the first instance become known to us through a totally different channel. Thus we originally see nothing but a party-coloured plane. The third dimension of space (which it is needless to say is the same thing as distance in a line from the percipient) and, by consequence, geometrical solidity, are altogether invisible.

"Prior to experience," says Mr. Stewart, in explanation of the theory under review, "all that we perceive by the sense of sight is superficial extension and figure, with varieties of colour and of illumination. In consequence, however, of a comparison between the perceptions of sight and of touch, the visible appearances of objects, together with the correspondent affections of the eye, become signs of their tangible qualities, and of the distances at which they are placed from the organ. In some cases our judgment

proceeds on a variety of these circumstances combined together; and yet so rapidly is the intellectual process performed, that the perception seems to be perfectly instantaneous *."

From this brief sketch it is manifest, that Berkeley's doctrine on the subject before us consists of two parts, which it is highly necessary to distinguish.

First, he asserts that distance, or the third dimension of space, cannot be directly seen: secondly, he maintains that we learn to see it by means of the touch.

As this is a doctrine wholly contrary to the universal and natural impressions of mankind, we should expect it to be supported by an appeal to facts of every description likely to throw light upon the subject. We should expect the author to show, not only that it corresponds with our own consciousness when rightly interpreted, but that the original incapacity to see distance, and the process of learning to see it, described by him, are always to be observed in children; that they have been invariably exhibited in instances (if such were known to him) of blind persons restored to sight, and that they are to be remarked in the lower animals.

* Outlines of Moral Philosophy, 4th edit., p. 26.

The author, however, presents us with no proofs of this kind. In dealing with the first part of his subject, he begins by asserting that it is impossible to see one object to be at a greater distance than another; or, in fact, to see that it is at any distance at all; and in support of this assertion he alleges one solitary reason of an *a priori* character, a sort of mathematico-metaphysical argument, of which, in order to avoid misrepresenting its import by using any other language than his own, it may be well to give a literal quotation.

"It is, I think, agreed by all, that distance of itself and immediately cannot be seen. For distance being a line directed endwise to the eye, it projects only one point in the fund of the eye; which point remains invariably the same whether the distance be longer or shorter."

Such is the single reason he assigns to prove the invisibility of distance.

On a careful search through his essay, I find the assertion that distance cannot be seen repeatedly made, but this is the only argument by which he supports it. After the most strenuous endeavours to comprehend the reasoning, I am not sure that I have succeeded in seizing either its meaning or its force. I have sought, therefore, for the construction put upon it by others.

Dr. Adam Smith has given the same argument in rather different terms, as follows: "If we consider that the distance of any object from the eye is a line turned endways to it, and that this line must consequently appear to it but as one point, we shall be sensible that distance from the eye cannot be the immediate object of sight, but that all visible objects must naturally be perceived as close upon the organ, or more properly, perhaps like all other sensations, as in the organ which perceives them*."

A recent writer expands the argument still more: "How," says he, "can vision of itself give us any notion of the distance of bodies, when we know that the light reflected from them, falls in straight lines on the eye, and can present only the ends of these lines to the organ? You can have no notion of the length of the line by being touched merely with one of its ends. We could as well know the length of a staff by having our eyes confined merely to the breadth of its head†."

If this is to be considered as a true interpretation of Berkeley's language, his sole argument

* Essay on the External Senses.

† Young's Lectures on Intellectual Philosophy, p. 113.

is founded on the fallacy that we see the ends of the rays of light coming from an object to the retina, but not the length of the rays. Thus, suppose the distance of B to be double that of A; B, according to this view of the matter, cannot be seen to be more distant than A, because the lengths of the rays from the two objects (and of course the difference between those lengths) are invisible, the eye perceiving the points or ends only.

Now it is certainly true, that we see by means of rays directed endwise to the eye, but it is equally true that we do not see the rays themselves either endwise or sideway: we simply see the object and nothing else. In other words, when rays of light from any object fall on the retina, an event takes place in the mind, described by the phrase, "seeing the object," without any consciousness either of the rays of light, or of the picture on the optic nerve, or of any other part of the physical process concerned in producing the mental effect. These are things we certainly do not see. But let us suppose that it is meant to assert not that the ends of the rays are *seen*, but only the physical fact that they are presented to the organ. The argument would, then, amount to this: "because in the *physical* process

necessary to seeing, straight lines of light proceeding from objects at various distances alike present their ends to the retina, or fall upon it, therefore the *mental* effect cannot comprise any perception of the various distances of the objects:" in which argument the premises most assuredly do not furnish the conclusion. Whether the mental effect does or does not comprise such a perception, is a question of fact which can be determined only by an appeal to evidence.

If it be alleged, that the representation here given of Berkeley's meaning is not faithful; that he himself says not a word about rays of light, but merely describes distance as a line presented endwise to the eye, nothing is gained to his cause. The weakness of his argument, indeed, becomes on this supposition still more manifest; for as the line he speaks of, if it is not a ray of light, can be merely an imaginary line, it can neither be seen nor be presented in any way to the organ of sight; nor can it project a point on the retina. Nothing but a material object can be concerned in any of these effects, and consequently if such be his meaning all the substance of the argument disappears.

There is still, however, one proposition or expression in the passage under review not yet

considered. He affirms, that the point projected by distance in the fund of the eye remains invariably the same, whether the distance be longer or shorter; intending the proposition as part of the proof that distance cannot be seen. If there is any meaning in this beyond what has been already considered, it is not very apparent. The simple facts regarding points "projected," according to his own expression, "in the fund of the eye," are, that the retina has a certain expanse which receives the rays of light proceeding or reflected from external objects; that this expanse is at all times equally, although differently occupied, at whatever degrees of remoteness particular objects may be; and that on the approach or recession of an object, there is nothing more than a change in the mode in which it is occupied.

Now it is not improbable that Berkeley meant in effect to say, that these differences and changes in the mode in which the retina is filled, cannot be attended with a perception of different distances, as they amount only to the diversification of a surface*; but if such were his intention, the

* Speaking of visible objects, Berkeley in one place uses the following language: "they may, indeed, grow greater or smaller, more confused or more clear, or more faint, but they do not, cannot, approach or recede from us."—*Sect.* 50.

reply is again, that he is merely asserting the position to be proved. There is plainly no impossibility in the supposition that these diversities are accompanied by intuitive perceptions of various degrees of proximity in the objects, and whether they are so or not is a question of fact which cannot be determined by *a priori* reasoning.

All this has indeed been expressly admitted by Dr. Thomas Brown, who went even beyond Berkeley in curtailing the original powers of the eye. "I have said," he remarks, "that the knowledge of the real magnitude, figure, and position of bodies, could not be obtained immediately from the diversities of the mere surfaces of light at the retina; unless it were the suggestion of some instinctive principle, by which the one feeling was, originally and inseparably, connected with the other: and I have made this exception, to prevent you from being misled by the works on this subject, so as to think, that the *original conception of distance implies in the very notion of it a physical impossibility**."

"I am far from saying," he adds, "that there truly *is* such an instinctive association of our

* Lectures, vol. ii, p. 68.

original visual feelings, with corresponding notions of distance and magnitude, in the present case; for at least in man I believe the contrary. I mean, only that the question has, *a priori*, only greater probability on one side, not absolute certainty; and that experience is necessary before we can decide it with perfect confidence*."

I have stated, that Berkeley adduces only one solitary argument to prove the impossibility of seeing distance; but there is another, akin to it, if not fundamentally the same, which has been frequently employed by his followers, and may be properly noticed here†. *He* contends, as already explained, that distance cannot be seen because visible objects are perceived by rays directed endwise to the eye, or literally because distance is itself a line directed endwise to the eye: *they* maintain, that objects situated at different distances, or what is the same thing, objects of three dimensions, cannot be visually perceived to be so, because they may be represented on a flat surface, so as to deceive the sight. This is virtually arguing, that because

* Lectures, vol. ii, p. 69.

† It may perhaps be traced to Locke, as will be noticed in chapter vi.

planes can be made to look solid, solid objects are originally seen plane—an argument in which there is no connection between premises and conclusion. Let us, however, take it literally as it is put. Solid objects, they say, must be originally seen as plane, because they may be delineated on a plane surface so as to look solid. In this shape their argument, like Berkeley's, obviously assumes the very point in dispute, as any one who throws it into a formal syllogism will see.

All objects which can be delineated on a plane surface, so as to deceive the sight, must be originally seen as plane ;

Solid objects can be so delineated ;

Therefore solid objects must be originally seen as plane.

In this syllogism, the major proposition is evidently the precise matter in controversy which itself requires to be proved. What reasons can be assigned for the position, that objects which can be delineated on a plane surface must be originally seen as plane? It is of no avail to the argument, that the eye is deceived by such representations into a belief in the reality of the depicted objects. If, instead of instances being adduced that planes are mistaken for solids, it

could be shown that *solid* objects within the range of distinct vision are sometimes mistaken by the mature eye for *planes*, before there has been an opportunity of touching them, such a fact would form no inconsiderable ground of probability in favour of the doctrine contended for. Supposing the doctrine to be true, we might expect illusions of this kind (which would indeed be merely recurrences of natural and original impressions) occasionally to happen even to the most experienced observer. Our associations in this as in other cases (language for example) might fail, or have their fits of intermission, during which we should unavoidably relapse into our primitive perceptions. But to bring the most glaring and indisputable instances of plane pictures being mistaken for solid objects, is not advancing a single step in proof that solid objects are originally seen as plane. If such examples prove any thing, it is our inveterate proneness to see objects to be at various distances, whenever the natural appearances of distance or solidity are presented to the eye, although it may be done by artificial means and in an imperfect manner; and this proneness, far from being an argument in favour of the tactual origin of visible distance, is most readily accounted for on

the antagonist principle. Accordingly we find that the illusion effected by the skill of the painter as well as of the optician, has been adduced as a consideration inimical to Berkeley's theory. An eminent French physiologist, after contending that it is one of the primitive attributes of the sight to give us notions of the distance, magnitude, and figure of bodies, proceeds to ask, "si cela n'était pas, pourquoi dans les illusions d'optique, lesquelles sont dues à la diversité de reflexion et de réfraction des rayons, verrions-nous tant de distances, de grandeurs, de figures qui sont illusoires, et sur lesquelles conséquemment le toucher n'a pu éclairer? comment concevoir l'illusion de l'art de la peinture*?"

The major proposition of the syllogism thus manifestly stands without proof, and is inadmissible until valid grounds can be assigned for it. But the minor proposition is not less disputable, or more correctly speaking is untrue. Remote objects of three dimensions may be delineated on a flat surface so as to deceive the eye, but such as are within a certain range of proximity cannot. Professor Wheatstone has shown, that when a solid object is seen with

* Physiologie de l'Homme, par N. P. Adelon, tome premier, p. 465. 2d edit.

both eyes so near as to require the visual axes to converge, a different perspective figure is projected on each retina, which is attended by the perception of geometrical solidity; while, if a painting of the same object were looked at, it would project the same figure on both *retinæ*, and be perceived as a plane. "It will now be obvious," he says, "why it is impossible for the artist to give a faithful representation of any near solid object, that is, to produce a painting which shall not be distinguished in the mind from the object itself. When the painting and the object are seen with both eyes, in the case of the painting two similar pictures are projected on the retinæ; in the case of a solid object the pictures are dissimilar. There is, therefore, an essential difference between the impressions on the organs of sensation in the two cases, and consequently between the impressions formed in the mind: the painting, therefore, cannot be confounded with the solid object*." Here we have a cause, which renders it impossible that solid objects and their pictures, within a certain distance, should be confounded when seen with both eyes;

* Phil. Transactions, 1838, part ii, p. 372.

but even if this cause did not exist, the impossibility would in point of fact remain. A person with one eye can no more be deceived by a painting sufficiently near, than a person with two eyes.

When we are at any time deceived by a painting, or led to doubt whether any object is a solid, or only the picture of it, what method do we adopt to satisfy ourselves of the truth? We approach the object, and our doubts are effectually dispelled by a near inspection, without any appeal or any thought of appealing to the sense of touch. When we are near enough, the sight can always discern whether the object is a picture or a reality, and this is equally true whether we use both eyes or only one.

The preceding remarks will be found, I apprehend, to contain a sufficient answer to an able exposition of the Berkelcian theory put forth by Mr. Whewell in his recent work "On the Philosophy of the Inductive Sciences." The passage is too long to be quoted here, but will repay the reader for the trouble of referring to it in its original place *. His main allegations

* Vol. i, p. 108, et seq.

in support of the doctrine of Berkeley (if I have not mistaken his meaning) will be found when analysed, to be those which have just occupied our attention.

SECTION III.

CONTINUATION OF THE SUBJECT.

Berkeley's argument to prove the impossibility of seeing distance is thus obviously reducible to a mere unsupported assertion, and the later argument of some of his followers, adduced to show that we must originally see all things in the same plane, is as obviously unsound.

But we may go further than this, and not only affirm the possibility of seeing distance, but that there is no difficulty involved in it which does not equally belong to the perception of distance by touch. One is just as simple and intelligible an act or process as the other; in other words, the perception of inequalities of distance by the touch is not more easy to conceive or to explain, than the perception of

inequalities of distance by the sight. In this respect the two senses are exactly on an equality. If this can be established to the satisfaction of the inquirer, it will form a strong presumption against a doctrine which attempts to resolve one perception into another not more explicable than itself. It may be necessary to premise that Berkeley makes no distinction between tactual and muscular sensations, so clearly discriminated by later writers*; but comprehends them under the same term, and as no error can arise from this source, I shall not deem it necessary on all occasions to be more precise in this respect than the author on whom I am commenting.

The process of perceiving different degrees of distance by the touch may be described as follows. The arm is gradually stretched forth, and, at every remove, there arises a sensation in the muscles accompanied by a perception that the arm is further and further from the body: or if we think it will describe the process better, we may say, that the several sensations include the perception of different distances. Or the process of perceiving inequalities of distance

* Dr. Thos. Brown and Sir Charles Bell: see the Treatise on the Hand by the latter author, p. 232, 4th edit.

may be thus: the hand is passed over an external substance, and the tactual sensations experienced are attended by the perception that the parts of the substance are at different distances from each other and from the percipient. For our present purpose both these processes are essentially the same.

Why, or how it is, that these tactual and muscular sensations are not felt without a perception of different distances; or, in other words, why the former are accompanied by the latter, we cannot explain. Such is the fact described in as plain language as can be found.

These perceptions of distance or extension in a direction from the percipient, attending muscular and tactual sensations, or forming a part of them, are evidently as immediate effects of the constitution of our organs as the sensations themselves. To borrow an illustration from another sense, we might as well attempt to conceive the various musical sounds of an air without a perception of varieties of pitch, as these tactual sensations without the perception of varieties of distance.

Thus the perception of different distances by the touch arises when different impressions are made on the tactual organs; but it is a process

no simpler, not in any way more explicable than the immediate perception of distances by the eye when different impressions are made on the retina. Let any one attend to his sensations respectively when he tries to estimate the distance of an object by his eye, and by stretching out his arm, and determine for himself whether one is a more or less intelligible operation than the other.

Hence, on Berkeley's theory, that the different impressions on the retina and other parts about the eyes, are merely signs of tactual perceptions of distance, nothing is gained in point of intelligibility. It introduces a circuitous process for no purpose, as it is just as easy to conceive such visual impressions to involve perceptions of distance, as to conceive any tactual impressions to do so. No reason can be assigned why one should not do it as well as the other. This will be more clearly shown by a minuter comparison of visual sensations with those tactual sensations of which Berkeley supposes them to be signs.

Let us take Berkeley's first sign of distance, the disposition of the eyes. A certain disposition of the eyes, according to him, is a sign of a certain distance, because it has accompanied the

perception of that distance by the touch. Now what is this perception of distance by the touch? It is, as we have seen, the consequence, or accompaniment, or component part of a peculiar sensation or set of sensations in the arm, arising from a certain state of the muscles. But the disposition of the eyes is also accompanied by a peculiar sensation, arising from a certain state of the muscles in that part of the body where the eyes are situated. Why should not the latter muscular sensation be attended by the perception of a certain distance as well as the former? What greater difficulty in conceiving one than the other? in conceiving that a muscular sensation about the eyes should be conjoined with a perception, than in conceiving a muscular sensation in the arm to be so conjoined? Why the roundabout operation of making the former a sign of the latter, and thence an indication of distance? As far as this sign of distance is concerned, Berkeley's theory is a mere unsupported assertion. There can evidently be no reason for supposing that different muscular dispositions of the eyes are not accompanied by a direct perception of different distances, as well as muscular dispositions of the arm, and it is surprising that, even on his own principle, he should not

have at once discerned the equality of the two cases.

Let us proceed to the next sign, the fainter appearances of objects as they are at greater distances. These degrees of faintness, according to Berkeley, are indications of degrees of distance only because they have been connected by experience with different tactual or muscular sensations in the limbs.

But here again the same argument is applicable. There is no more difficulty in conceiving different degrees of faintness; or, in other words, different visual sensations, to be directly accompanied by perceptions of degrees of distance, than different tactual sensations. We *feel* objects to be at different distances; we *see* objects to be at different distances; these are equally simple propositions, equally explicable or inexplicable. When we *feel* an object at any given distance, the muscles, and thence the nerves, of the arm are put into a certain condition; when we feel another object at a greater distance they are put into a different condition. When we *see* an object at any particular distance, the retina is put into a certain condition; when we see another object at a greater distance, the retina is put into a different condition. Why the different conditions of the muscles and nerves of the arm

should give the perception of different distances, and not the different conditions of the retina, no reason can be assigned. Antecedently to an appeal to facts, they both stand in relation to our intelligence precisely on the same ground.

It is unnecessary to pursue the argument in regard to other visual signs of distance, as it would be merely repeating, *mutatis mutandis*, what has already been urged; but the reader may be asked what tactual or muscular feelings can be conceived as more clearly involving the perception of different distances, or of geometrical solidity, than the visual impression experienced by a spectator when one body gradually intercepts the view of another, or even when he looks upon his own hand, or upon the chairs and tables before him?

The considerations here adduced to show, that the theory under review attempts to explain the visual perception of distance by resolving it into a process no more explicable than itself, form no unimportant presumption against it, and will prepare the reader for an examination of the mode in which, according to Berkeley, the perceptions of touch are transferred to the sight. It will not be difficult to prove, that the mode is as impossible as the transfer is needless.

SECTION IV.

CONTINUATION OF THE SUBJECT.

It may be necessary to remind the reader that Berkeley's theory on the subject of visible distances asserts two positions: 1. That distance, or the third dimension of space, cannot be directly perceived by the sight. 2. That our seeing objects to be at various degrees of proximity, or the kind of perception we actually have of such degrees by the sight, whatever it may be, has been attained through the medium of the touch.

In regard to the first position, the preceding sections have endeavoured to show not only that Berkeley's argument to demonstrate the impossibility of seeing distance takes for granted the very thing to be proved, but that the immediate perception of the third dimension of space by the eye is not more difficult to conceive and explain, than the immediate perception of it by the touch.

We have now to address our attention to his second position. As he has failed to show the impossibility of seeing inequalities of distance immediately, and to bring any positive proof

that the sight has not this original faculty, the whole success of his theory must rest on his clearly tracing, to the satisfaction of our own consciousness, the precise way in which the sense of touch is instrumental in bestowing the faculty which he thus denies to be original.

Berkeley might, perhaps, have objected to the effect which he attributes to the touch, being described as enabling us actually to *see* distance. Yet his own language is sometimes not less strong. "It is plain," he says in one passage, "that distance is in its own nature imperceivable (*i. e.* by sight), and yet *it is perceived by the sight.* It remains, therefore, to be *brought into view* by means of some other idea * that is itself immediately perceived in the act of vision †."

Here he plainly represents that distance is only kept back awhile from the sight, till it has been introduced by something directly visible, when it becomes equally visible itself, or, in the author's own words, is "brought into view."

In subsequent passages, however, he qualifies his language and softens down his expressions:

* Berkeley uses the term idea to denote "any, the immediate object of sense or understanding."—Sect. 45.

† Sect. 11.

distance, and things placed at a distance, are said to be "not *truly* perceived by sight*," "they are not, *strictly speaking*, the object of sight†."

By and by he grows bolder, and characterizes "the propension" we have to consider distance to be the immediate object of sight, as a mere delusion‡ and prejudice; a prejudice, nevertheless, which he acknowledges "sticks so fast, that it is impossible without obstinate striving and labour of the mind, to get entirely clear of it§."

If we advert to the language of subsequent writers who have adopted Berkeley's views, we shall find them all agree in describing the ultimate effect produced by touch on our power of visual perception, either as enabling us actually to see, or engendering a strong conviction that we actually see distance.

"We do not," says Dr. Brown, "merely see with our eyes what we may have felt with our hands, but our eyes, in the act of vision, have *borrowed*, as it were, those very sensations‖."

"The sensations of colour," says Mr. Mill, "and what we may here, for brevity, call the sensations of extension, of figure, of distance, have been so often united, felt in conjunction,

* Sect. 45. † Sect. 46. ‡ Sect. 126 and 146.
§ Sect. 146. ‖ Lectures, vol. i, p. 546.

that the sensation of colour is never experienced without raising the ideas of the extension, the figure, the distance, in such intimate union with it, that they not only cannot be separated, but *are actually supposed to be seen**."

On this point, however, there needs be no dispute. In whatever terms Berkeley or any one else may choose to describe them, we all know what our perceptions actually are when we look upon objects at various distances; and the production of these, as he denies them to be original, is to be accounted for. The theory asserts, that originally the sense of sight in every human being had very different perceptions; that all objects, however near, or however remote, appeared in the same plane, or at the same distance; and that the change from having the latter kind of perceptions to having the former, was brought about in some way or other through the instrumentality of the touch.

Berkeley describes this change as effected by our learning from experience the connection between visible and tangible objects, and by visible appearances thence acquiring the power of suggesting to us tangible distances; in which

* Analysis of the Human Mind, p. 74.

way we come to have the kind of visual perception of which we are actually sensible.

In this process, as observed in a former section, there are two stages to be remarked. 1. We are described, as learning from experience a connection between visible and tangible objects, which can mean nothing more than that we perceive them at the same time or in close succession. 2. After both have been thus perceived together, the former being perceived alone suggest the latter.

Thus the change in our visual perceptions, which the theory represents as taking place,—the change, namely, from seeing all objects as a party-coloured plane, to seeing them, or believing we see them at various distances from the eye—must happen either when we are both touching and looking at the objects, or when we are subsequently looking at them without touching, and when, consequently, their tangible qualities are merely suggested and conceived.

But the act of touching the objects while we are looking upon them, cannot make any alteration in the nature of our visual perceptions: if we before saw a party-coloured plane, we shall continue to see it. The perceptions of one sense cannot change the character of the

perceptions of another sense, merely by being experienced simultaneously with them. If they could, those of sight might alter those of touch, as well as the latter produce a change in the former.

This impossibility is proved by looking into a mirror. No touching or handling can cause us to see the images reflected in the glass to be on its surface. We see them beyond the surface, and cannot even imagine them otherwise. If the case were reversed, if objects near and remote, superficial and solid, as the theory before us asserts, appeared to the sight as a party-coloured plane, all the touching or feeling in the world could not make us see them to be at various distances.

It is, if possible, still more manifest that the alteration in our visual perceptions, could not take place in the second stage of the process. If the external world, as the theory asserts, originally appeared to the sight merely a party-coloured plane, or a set of equidistant colours, visible appearances would, doubtless, become associated with our tactual perceptions, and they would reciprocally suggest each other. A certain peculiar appearance would suggest a certain tangible distance, just as the tangible distance would

suggest the peculiar appearance; but if that peculiar appearance formed originally to our eyes part of a plane surface, the mere remembrance or conception of the tangible distance could not make it seem otherwise. If actually feeling the distance while we were looking at it could not alter our visual perceptions, the remembrance or idea of the tactual perception could not certainly have any such effect.

It is evident, then, that any effect which could be produced on a visual perception by the suggestion or recollection of a tactual perception would *a fortiori* be produced, if the two perceptions were simultaneously experienced. Hence the real question to be determined, although Berkeley seems not to have been aware of it, is not what can suggestion do in modifying a perception, but what can the simultaneous perceptions of two senses do in modifying each other; and it is quite clear that they cannot alter each other's original nature.

Let us illustrate the subject by supposing a blind man suddenly endowed with perfect sight. He sees before him, according to the theory, a party-coloured plane, and while enjoying his novel sensations, he stretches forth his hand and

touches what proves to be an orange. He knows the orange of old by touch, and knows also the tangible distance at which it is from himself; *i. e.* he knows the ratio which the space between himself and the object bears to other tangible spaces. Now on the theory under our review, if we construe it as referring the change to the first stage, when he both feels and sees his hand touch the orange, he will *see* the distance of the orange which he was previously incapable of doing. But how is he to find all this out? how is he to discover what portion of the party-coloured plane he is touching? He sees his own hand, it may be said, but as an object of sight his own hand is only a portion of the party-coloured plane, and when he moves it, he sees only a change in the relative position of the colours. Let him make as many movements as he likes, all these are to his eye equally mere changes of colour or diversities effected on the surface before him. The result could be only this, that his muscular and tactual feelings in stretching forth his hand and touching any object, as they would be attended with certain changes in the coloured plane, would come to be associated with such changes, so that he would

always expect a similar motion of his hand and a similar visual change to happen together.

He would expect, as soon as he willed to move his hand to the tangible orange, to see simultaneously with experiencing certain muscular and tactual sensations, a flesh-coloured portion of the plane move from its position, undergo a slight change of form, and approach the yellow circular portion. The yellow circle, whenever seen of the same size and intensity of colour, might thus come to suggest or bring to his mind certain sensations of his arm and hand, and certain changes of form and position in the coloured plane accompanying those sensations. But still there would be nothing in all this to cause the coloured plane to appear any thing else than a plane. All that can be proved to take place in the process of association might take place without involving the perception of visible depth or distance.

Thus if the visible world originally appeared to the sight a plane of this kind, there is nothing in feeling or touching objects, much less in subsequent recollection, to make it appear otherwise. The simultaneous exercise of two or more of our senses confers no new faculties upon them.

Their respective sensations may be experienced together and thenceforward associated, but they always remain distinct and *sui generis* whether actually felt or only conceived.

Berkeley appears to have paid no attention to the first stage of the process as here distinguished from the second. He attributed no part of the alteration in our visual discernment to the simultaneousness of the perceptions of sight and touch. He seems not to have adverted to any change at the time the association is established, but only to its operation when formed. Strictly speaking, as we have shown, *mutatis mutandis*, in the section on outness, his theory considers our perceptions of visible distance to be owing to visible appearances, or visual sensations suggesting tangible distances. Thus stated, his doctrine, if true, might be a sufficient reply to the question, "why, when I simply look at objects without touching them, do I see them to be at various distances?" but not to the question, "why, when I both touch and look at objects, do I see them to be at various distances?" Berkeley's answer to the first question would be, "because their visible appearances suggest or remind you of their tangible distances;" but an answer to the second must leave out suggestion

or recollection altogether, and say, "because their visible appearances are accompanied by the perception of the tangible distances.

That Berkeley thus passed over the first stage of the process was probably owing to the circumstance, that in the great majority of cases, when we are in the act of seeing distance, we are necessarily precluded from feeling it also, whence it follows, that on his theory the visual perception of distance must be usually an act of association.

However this may be, it is certain that in speaking of the change in our visual perceptions, he refers it to the suggestion of tangible distances by visible appearances, a process necessarily implying the absence of the tactual perception; and he attributes a great part of the effect to some circumstances in this process of suggestion, which will require a rigorous scrutiny. To this we shall devote a separate section.

SECTION V.

CONTINUATION OF THE SUBJECT.

In entering upon the examination proposed in the last section, it may be necessary to call the

attention of the reader more particularly to the nature of the change in our visual perceptions, or to what is necessarily implied in that change when it is thus affirmed to be the work of suggestion.

In all cases of suggestion, or association between two things, when one of them alone is perceived by sense an idea or conception of the other follows; and such ideas or conceptions, are usually termed copies or transcripts of the original perceptions. When derived from different senses they are as distinct from each other as the original perceptions themselves. Thus the idea of the fragrance of a rose rises in the mind at the mere sight of the flower, and a conception of the smoothness of its petals to the touch rises at the same time; both conceptions presenting themselves without confusion as originating from their respective senses. So when visible appearances remind us of any other tangible properties, as heat and roughness, these properties, although associated, are conceived distinct from each other and from the perceptions of sight by which they have been introduced.

All this is generally admitted; but in the case of visible appearances suggesting to the mind

tangible distances, the theory of Berkeley represents that these distances are not merely conceived by the intellect as tangible, but perceived by the eye, or in different language, that they are transformed from mere *tactual conceptions*, such as they are and such as they remain in all other cases, into *visual perceptions*.

Thus the theory absolutely attributes to suggestion a transmutation of the conceptions derived from one sense into the perceptions of another; a transmutation of the conceptions derived from touch into the perceptions of sight.

Berkeley himself could not have denied the truth of this representation, and would only have qualified it by saying that the visual perceptions of distance into which the tactual conceptions appear to be transformed are not real but illusory.

Now as this is an effect, however it may be designated, altogether different from any produced in the ordinary course of association, it can be proved to take place only by showing that there are peculiar circumstances in the case before us sufficient to occasion it. Berkeley accordingly attempts to point out those particular causes to which it is owing that mankind come to regard themselves as really seeing what,

in truth, according to his theory, they only recollect having felt by the touch.

He assigns two circumstances as contributing to this effect, both of which are not only incapable of producing it, but have no tendency to produce it, as a brief examination will suffice to prove.

In one passage, after acknowledging that "we have a very great propension to think the ideas of outness and space (or distance) to be the immediate object of sight," he attempts to account for it by calling it "a mere delusion arising from the quick and sudden suggestion of fancy, which so closely connects the idea of distance with those of sight, that we are apt to think it is itself a proper and immediate object of that sense till reason corrects the mistake *."

In another passage, containing the same doctrine, he assigns a further cause for the delusion in the circumstance, that little notice is taken of the visible appearances, the attention of the mind being engrossed by the tangible objects suggested.

"No sooner," he says, "do we hear the words

of a familiar language pronounced in our ears, but the ideas corresponding thereto present themselves to our minds; in the very same instant the sound and the meaning enter the understanding: so closely are they united, that it is not in our power to keep out the one except we exclude the other also. We even act in all respects *as if we heard the very thoughts themselves.* So likewise the secondary objects, or those which are only suggested by sight, *do often more strongly affect us, and are more regarded,* than the proper objects of that sense, along with which they enter the mind, and with which they have a far more strict connection than ideas have with words. *Hence* it is we find it so difficult to discriminate between the immediate and mediate objects of sight, and are so prone to attribute to the former what belongs only to the latter. They are, as it were, most closely twisted, blended, and incorporated together. And the prejudice is confirmed and rivetted in our thoughts by a long tract of time, by the use of language, and want of reflection *."

Let us examine the sufficiency of the two

* Sect. 51.

reasons here assigned to account for the universal delusion, as Berkeley terms it, under which mankind labour in believing themselves to see the distances of objects.

1. As to the quick and close suggestion of tactual perceptions by visible appearances, which is here so strongly insisted upon, a little consideration will show that the quickest and closest suggestion could not produce the delusion ascribed to it, which, as already stated, would be, in effect, nothing less than the transmutation of conceptions derived from the sense of touch into perceptions of sight. In no instance through the whole range of mental phenomena can such a transmutation be shown. The circumstance of the conception suggested by any visible object, following more or less rapidly, cannot alter the nature of the process. When a person has but just learned to read, the suggestion of the sounds by the written words takes place slowly, while in the case of a person who has long been familiar with the operation, it is effected with wonderful rapidity; but, in both cases, the process is essentially one and the same. The signs are the same, the things signified are the same, and the different degrees of rapidity with which the one are succeeded by the other can mani-

festly change neither parts of the sequence, no more than travelling slowly or quickly through a country can change the character of the objects along the road.

2. The same observations are applicable to the second reason assigned for the delusion under which mankind labour, *viz.* the little notice taken by the mind of the signs or visible appearances indicating distances, and the engrossment of the attention by the tangible objects suggested.

In the instance of language, it is manifest that whether a man's attention is absorbed by the ideas raised up in his mind by the written words before him, or it is divided between the signs and the things signified, both parts of the sequence will retain their peculiar characters; and it would be just the same if visible appearances suggested tangible distances.

Berkeley's representation proceeds on a total misapprehension of the intellectual process which takes place in such instances. The quickest and liveliest conception suggested by any object, must, equally with the tardiest and the dullest, be a copy or transcript of some perception. If it is so lively as to absorb the attention and lead to any delusion at all, that delusion must consist in believing the conception suggested to be a

perception of the sense from which it was originally derived, and not a perception of a different sense. Take again, as an example, that important class of signs constituting language, where it is common for the mind to pass instantly from the perceptions of sense, without any notice of them, to the ideas they suggest. When we are listening to the eloquent orator, who is depicting in the most vivid terms at his command some interesting visible scene, what is the effect on our minds? Do we imagine, or have we the least tendency to imagine, as Berkeley adroitly insinuates rather than asserts, that we *hear* the described objects*? The very notion is preposterous. If there is any semblance of the transmutation of ideas into perceptions, any momentary illusion, any deception of the senses or the intellect at all, it is a tendency to imagine we *see* those visible objects which we only conceive: the art of the orator, according to the

* "We even act in all respects *as if we heard the very thoughts themselves.*"—Theory of Vision, sect. 51. In the "Minute Philosopher" he goes further than this: "I see, therefore," (asks one of the interlocutors) "in strict philosophical truth, that rock in the same sense that I may be said to hear it when the word *rock* is pronounced?" The reply is, "In the very same."—Dialogue iv, sect. xi.

common phrase, brings the whole scene before our eyes.

If, again, we are silently reading a description of various sounds, we do not fancy we see them because the signs happen to be addressed to our eyes; but if we feel any thing approaching to an illusion, it is a fugitive belief that we hear the sounds instead of merely conceiving them; as in reading that passage in Beattie's Minstrel, which so vividly recalls the audible charms of a summer's morning.

> "But who the melodies of morn can tell?
> The wild brook babbling down the mountain's side,
> The lowing herd, the sheepfold's simple bell,
> The pipe of early shepherd dim descried
> In the lone valley."

A better illustration still may be found in the instance of an expert musician silently reading a musical composition. It is the same in all cases of association. When we are strongly reminded of an odour by a visible object, as a rose, we do not seem to see the odour, but (if there is any delusion at all) to smell it. When we are reminded of a sound by a sensation of touch, we cannot fancy we feel the sound, but may possibly imagine we hear it. It is well known to have been a favourite opinion with Dugald Stewart,

that a conception is always accompanied with a momentary belief of the actual perception of the object. All that we have to do with this doctrine at present, is to cite it in proof of the direction which the illusion takes when it is experienced. It may be laid down as a general law, that when the mind neglects the sign and passes on to the thing signified—when it does not attend to the actual *perceptions*, but is absorbed in the *conceptions* to which they give rise—it is apt to fancy not, as Berkeley's theory requires, that it perceives the suggested objects *with the sense actually in exercise*, but that it perceives them *with the sense to which the conceptions belong*, or from which they have been derived.

If then it were true, as represented by Berkeley, that in seeing distance the mind passes over the visible signs of it with little notice, and regards almost exclusively the tangible reality suggested, still we should not imagine we *saw* the tangible distance which we thus vividly conceived, but we should have a tendency to believe that we actually felt it with the touch. The absorption of our attention by the tactual conception suggested would withdraw the mind from all notice of visual perceptions, instead of converting the former into the latter.

It is, in truth, most extraordinary in Berkeley to have imagined, that withdrawing the attention from the perceptions of sight to the conceptions derived from touch, should cause the mind to mistake the latter, on which its attention is concentrated, for the perceptions of the neglected sense.

It will, perhaps, appear not less extraordinary, that he should have supposed any mistake of this nature to be at all practicable, when we reflect that, according to his repeated assertions, the perceptions and ideas of the two senses respectively are so totally unlike as not to have the least point of resemblance. How then could they be mistaken for each other*?

These few observations will suffice to show, that the causes assigned by him could not produce the delusion, as he calls it, under which mankind labour in thinking they see distances.

* "The extension, figures, and motions perceived by sight, are specifically distinct from the ideas of touch, called by the same names; nor is there any such thing as one idea, or kind of idea, common to both senses."—Sect. 127. And yet Berkeley acknowledges, in a subsequent passage, that we are more apt to confound visible and tangible ideas (things so totally unlike) than any other signs with the things signified." —See sect. 144.

It may be thought, perhaps, by some, that he mentions a third cause worthy of consideration in the expressions, that "they (the mediate and immediate objects of sight) are most closely twisted, blended, and incorporated together," and that "they have a far more strict connection than ideas have with words." Every one, however, must see on reflection, that there can be no other meaning in such language, than that which we have already considered. "Twisted, blended, and incorporated," when used to denote an association between a perception and a conception, are varieties of figurative phraseology representing no real variety of facts, and can signify nothing, but that one directly and instantaneously suggests the other. They are attempts (probably unconscious ones) to extract support for a theory out of mere diversities of expression.

Nor can more be said for the assertion, that "they have a far stricter connection than ideas have with words." Strictness, in its highest degree, implies only that the connection is perfectly close (that is, without the interposition of any thing else, or any perceptible interval of time) and also invariable; in which respects the association between words and ideas cannot be exceeded.

Notwithstanding all that I have here urged, it may, perhaps, still be objected, that there are various expressions in popular use in which one sense is asserted to perceive qualities which are in reality cognizable only by another. It is common to say, for example, that a mass of lead looks heavy; that incandescent iron looks hot; and that an empty barrel sounds hollow. Now it is certain that weight and heat can be perceived only by touch, and that hollowness can be perceived only by the eye or the touch, and yet we find the perception of the first attributed to the eye, and of the second to the ear.

Here, then, it may be alleged is the very effect produced in other cases by that quick and close suggestion to which Berkeley attributes the delusion under which mankind labour as to the visual perception of distance.

In regard to the expressions quoted, however, it must be at once seen that the language is elliptical, and really amounts to no more than this, that the object looks as if it would feel heavy if lifted, or hot if touched, and so on.

Here there is no delusion, or none which the slightest consideration is not sufficient to dissipate. No person, on reflection, thinks he sees the quality of weight or of heat, or hears the

emptiness of a vessel, while all the reflection in the world cannot alter our belief that we actually see distance.

In all these cases, how quick soever the suggestion may be, the two parts of the combination are easily separable in thought: there is association, but no confusion; no identification of the thing perceived with the thing thought of. The idea suggested can be distinctly reflected upon as different from the perception which suggests it. If a lump of lead looks heavy, I have a clear conception of the heaviness as felt by my hand; and, what is still more important to be remarked, it cannot look heavy but by suggesting the muscular sensation.

On the other hand, as the next section will more fully explain, when we are under the "delusion" of believing we see the distances of objects, we are in most instances incapable of forming a distinct conception of the tangible distances erroneously said to be suggested: and, be this as it may, the fact is certain that we are constantly seeing distances without adverting in the slightest degree to the way in which they would affect the touch: we are not conscious of any such thought entering the mind, although we cannot regard an object as looking heavy or hot, without think-

ing of the tactual sensations expressed by those terms.

Thus if we go beyond the quality of extension, and consider the most striking instances which can be adduced of the quick and close suggestion of other tangible properties by visible appearances, we do not find that the rapidity of the process occasions any delusion, any mistaking of the conceptions derived from one sense for the perceptions of the other. We may therefore conclude, that this is a cause utterly incapable of producing the inveterate belief common to all mankind, that distance is immediately perceived by sight.

I have already alluded to the opinion of Mr. Dugald Stewart, that every act of conception is attended by a belief of the presence of the object; or, in other words, that every conception is really believed for the moment to be a perception. On this theory, if we think upon the moon, we shall believe we see it; if we think upon the fragrance of a rose, we shall believe we smell it; if we think upon the roughness of its leaf or its stem, we shall believe we touch it. Yet notwithstanding this, he coincided with Berkeley in the strange doctrine just examined; he maintained, that when we think upon the

tangible distance of any visible objects before us, we believe we *see* it—a conclusion utterly inconsistent with his own hypothesis, and yet singularly enough adduced by him in illustration of it. This is so remarkable an oversight, that it may be worth while to lay before the reader the proof that it has been really committed.

After referring to Berkeley's theory as something not to be controverted in the present state of science, and stating "that according to the received doctrine, the original perceptions of sight became, in consequence of experience, signs of the tangible qualities of external objects, and of the distances at which they are placed from the organ," he proceeds — "From these principles it is an obvious consequence, that the knowledge we obtain, by the eye, of the tangible qualities of bodies, involves the exercise of conception, according to the definition of that power which has already been given. In ordinary discourse, indeed, we ascribe this knowledge, on account of the instantaneousness with which it is obtained, to the power of perception; but if the common doctrine on the subject be just, it is the result of a complex operation of the mind; comprehending, first, the *perception* of those qualities, which are the proper and original

objects of sight; and secondly, the *conception of those tangible qualities*, of which the original perceptions of sight are found from experience to be the signs. The notions, therefore, we form, by means of the eye, of the tangible qualities of bodies, and of the distances of these objects from the organ, are mere conceptions; strongly, and indeed indissolubly associated, by early and constant habit, with the original perceptions of sight*."

Mr. Stewart had before defined *conception*, as "that power of the mind which enables it to form a notion of an absent object of perception, or of a sensation which it has formerly felt," elucidating his definition subsequently by adding, "the business of conception is to present us with an exact transcript of what we have felt or perceived."

According, then, to Mr. Stewart, when we look upon objects and perceive, as we think, their distances by the eye, there is a complex operation of the mind: —1. We see the original visible qualities. 2. The power of conception presents us with an exact transcript of the tangible distances of the objects; or, in other words,

* Elements of the Philosophy of the Human Mind, chap. iii, vol. i.

of our tactual perceptions of their distances. Now on Mr. Stewart's hypothesis that conception is always attended by a belief in the presence of its object, the result of this complex operation must be a belief that we are actually feeling the distances by the touch; whereas the result which he, with Berkeley, inconsistently describes as occurring in such a case, is a belief that we are actually seeing what we can have become acquainted with only through the sense of feeling; that we are seeing a property, which on their theory is purely and exclusively tangible.

SECTION VI.

CONTINUATION OF THE SUBJECT.

Throughout this discussion, except in a single passage, we have been admitting an assumption, the fallacy of which will be manifest to every one who will attend to his own sensations, and which it is now necessary to expose.

Berkeley's theory takes for granted, that when we see objects at various distances, those distances, or in other words, the intervening tangi-

ble spaces between us and the objects, are suggested to the mind. And not only does it affirm this, but, as we have just seen, it asserts that our attention is so exclusively turned upon these tactual suggestions, that the visible appearances before us are neglected and overlooked.

If this is a true representation, if it is a correct statement that our perceptions of visible distance are only close and rapid suggestions of tangible distance, it is obvious that when we are in the act of viewing objects, some near and some remote, we must have very clear conceptions in our minds of the intervening tangible spaces which are suggested. There could, at all events, be no room to doubt whether we had such conceptions or not, particularly as they are stated to absorb the attention to the neglect of the visible signs by which they have been introduced. Yet, for my own part, on appealing to my consciousness, I can discover no such suggestions. I see various objects around me in the room where I am writing; I see the table and the floor extending in a direction from my eye, but I am not conscious of any conception of tangible spaces.

Here, then, the alleged phenomena are at least

doubtful, when they ought to be clear and certain. A rigorous examination of the point in question is consequently requisite.

In maintaining the proposition that distances are not directly perceived by the eye but by the touch, Berkeley has over and over again repeated that they are suggested to the mind by visible appearances, just in the same manner as ideas are suggested to the mind by words.

Now in the association of ideas and spoken words there are two distinct things, one of which being perceived by the sense of hearing brings to mind the other. Thus the word "moon," as soon as it is pronounced, raises up in the mind the conception of that luminary. When the process is perfect, the idea suggested instantaneously presents itself, and it is what for want of a better term has been named, as already mentioned, an exact copy or transcript of the original impression on the sense from which it has been derived. If the conception suggested by the word "moon" were as perfect in itself and as rapidly produced as it could be, it would be no more and no less than an exact and instantaneous intellectual representation of what had been previously seen by the eye.

If then the perception of distance by the sight

is a process similar to the interpretation of language; if visible appearances in the one case hold a place analogous to that of verbal signs in the other, and tangible distances are suggested in the former after the same manner as the meanings of words are brought to mind in the latter, there can be no doubt as to what must ensue. As in the most perfect interpretation of a word there is a clear and instantaneous conception of the meaning asscciated with it, so in the most perfect interpretation of the visible signs of distance, there must be a clear and instantaneous conception of the tangible distance signified.

I have before me, for example, a chair at the distance of about two yards, and I see clearly, as I think, not only the chair but the intervening space. Now, according to the theory, the distance which I seem to myself to see, is only the tangible distance suggested to my thoughts by the visible appearances before me; and, consequently, I must have a clear conception in my mind of the tactual impressions occasioned by feeling a distance of two yards. The conception in my mind must be an exact copy of some anterior perception of touch. But in scrutinising as closely as I can the operations of my own

consciousness I find no such conception. When the word *moon* is pronounced in my hearing, there is an idea or image of the planet raised up in my mind; but when I see the distance of the chair, I am unconscious of any thing but the simple sight of the piece of furniture and of the interjacent ground. No idea, no copy of any tactual perception of distance presents itself.

This appeal to consciousness appears to me, I confess, quite conclusive against the theory of Berkeley. If that theory were true, we should undoubtedly be able to recall with distinctness the tactual perceptions of which visible appearances according to it are only the signs, just as in Berkeley's own comparison, we are able to recall the ideas associated with written or spoken words. Language is unmeaning in proportion as it fails to suggest ideas with clearness and precision, and visible appearances, on his theory, would remain unsignificant of distance, in proportion as they failed to suggest tactual perceptions of it. According to my own experience they do entirely fail.

It is, in fact, with great difficulty that we recall our perceptions of tangible distance, form, and magnitude; and for this reason, that we

are not at all in the habit of attending to these particular tactual sensations. Of all our sensations of touch they are the least regarded, and require the greatest effort to impress them on the mind.

Let any one shut his eyes and feel some object with his hands. He will be sensible of the weight and solidity of the body, also of the roughness or smoothness, the coldness or heat of the surface; but the tangible form, magnitude, and distance, will so instantly and vividly suggest the visible appearance of the object, that they themselves will hardly be noticed, and the moment he has quitted his hold and opened his eyes, he will probably find it impracticable to represent to himself a clear and definite conception of them. As the blind do not experience the same difficulty, it can be ascribed in those who see to nothing but a habit of inattention, and to the overpowering effect of our visual perceptions, compared with which our tactual perceptions of form and definite extension are feeble and obscure.

Thus so far from tangible distances being suggested by visible appearances, and thence producing the effects to be accounted for, it is remarkable that they are seldom if ever re-

called, and are, in fact, difficult to remember or conceive *.

That we do not find the same difficulty in recalling our other tactual sensations (those of resistance, of heat, of weight, and others, being recollected with great distinctness), is easily explained on the principle already intimated. The qualities which occasion them are exclusively tangible; and, of course, when they are at any time suggested to the mind, they can be conceived only as such. But extension and form are both visible and tangible, and our visual perception of these properties is so much livelier, readier, more complete, and comprehensive, than our tactual, and we are so much in the habit of exclusively attending to it, that the weaker impression seems overpowered and lost.

Berkeley himself seems to have had occasional glimpses of the truth, that in scrutinising our visual perceptions of distance, it is impossible to detect the tactual conceptions requisite on his theory, and described by him as absorbing the whole attention.

* Diderot has made the remark, that the recollection of touch is very fugitive from our habit of conceiving every thing as coloured. See his "Lettre sur les Aveugles."—Œuvres completes, tome ii, p. 141.

After contending, as we have seen, that tangible distances are suggested to the mind by visible appearances as ideas are by words, in which case they would be clearly conceivable distinct from their signs, he admits it to be almost impossible to think of them separately. According to him, the signs and things signified, the visual perceptions and tactual conceptions, in these cases, form a compound difficult to be analysed into its elements; a difficulty, which he illustrates again by a reference to language, in a manner evincing considerable confusion of thought.

"We cannot," he says, "without great pains, cleverly separate and disentangle in our thoughts the proper objects of sight from those of touch, which are connected with them. "This, indeed," (he continues) "in a complete degree seems scarce possible to be performed; which will not seem strange to us, if we consider how hard it is for any one to hear the words of his native language pronounced in his ears without understanding them. Though he endeavour to disunite the meaning from the sound, it will, nevertheless, intrude into his thoughts, and he shall find it extremely difficult, if not impossible, to put himself exactly in the posture of

a foreigner that never learned the language, so as to be barely affected with the sounds themselves, and not perceive the signification annexed to them *."

Here he manifestly confounds two different things — inseparability in conception, and indissolubleness of association. In the case of words we can always conceive the sound distinct from the meaning, although the one will unavoidably follow, or present itself simultaneously with the other. The indissolubleness of the association does not at all confuse or entangle the conceptions associated. It is the same in the association of visible appearances with such tangible properties as resistance and heat; and if Berkeley's theory were true, if our visual perceptions of distance were composed of visible appearances and the conception of tangible spaces, we should equally well be able, in every instance of the exercise of sight, to represent to ourselves tangible distance distinct from its visible signs, although not unattended by them. That it is "scarce possible to do it," or, in more correct language, impossible, would of itself suffice to disprove the doctrine that the visual perception

* Treatise on Vision, sect. 159.

of distance is merely the suggestion of a tangible property. Our inability to make the analysis is here a strong presumption that the compound does not exist.

It is quite possible, indeed, as we have already admitted, for visible appearances to be so connected in our minds with tangible spaces, as to suggest them; but this can seldom happen without an intentional effort.

If we at any time take the trouble of ascertaining the tangible distance of any object from the spot where we stand, and of impressing it on our minds, we shall undoubtedly be able to form a conception of it when we look at the object from the selected station; but it is equally undoubted that we shall have this tactual conception *in addition* to the visual perception of the distance, which visual perception will continue precisely the same as it was before we moved from the spot. By an intentional effort, for example, I may feel with my hand the distance of a book lying on the table before me, and which I now clearly see to be about a foot from the paper I am writing upon; and I may, with attention, conceive the tangible distance, when I no longer feel it: but this acquired tactual conception does not produce the slightest change in my visual perception; it

is nothing more than an idea superadded to those which the visible appearance had before the power of awakening. If, however, my visual perception of the distance were, as Berkeley represents it to be, the suggested idea of the tangible distance, the only effect of repeatedly feeling the distance of the book with my hand would be to refresh my recollection and make my visual perception more lively. The mere renewal of the tactual perception could not introduce any additional idea, any more than smelling again at a rose, although it would refresh and enliven my conception of its fragrance, could add to the ideas which the appearance of the flower had previously the power of suggesting to my mind.

Thus if we had any such ideas of tangible distance, as are essential to Berkeley's theory, they would be perfectly distinct from our perceptions of visible distance, and in nowise interfere with them. The independent existence of such tactual ideas, along with our ordinary perceptions of visible distance, is itself conclusive against the doctrine before us.

SECTION VII.

CONTINUATION OF THE SUBJECT.

In the preceding sections, my object has been to prove that Berkeley has failed to establish his theory, by showing. 1. That his only argument takes the point in question for granted. 2. That the visual perception of distance, which he pronounces to be impossible, is quite as conceivable and explicable as the tactual perception into which he resolves it. 3. That if we originally saw all objects as mere portions of a party-coloured plane, the touch could not enable us to see them otherwise in the way represented, or in any possible way. 4. That the doctrine, which resolves our visual perceptions of distance into suggestions of tangible spaces, is altogether at variance with our consciousness, and with the acknowledged laws of the human mind.

Thus far I have endeavoured to meet him on his own ground, and to demonstrate that the positions he has taken up are untenable. My next object will be to adduce some positive considerations showing that distance must be perceived by the sight; or, in other words, that ex-

ternal objects must be originally seen to be at some distance, and that they are actually seen to be at different distances just as clearly and certainly as they are felt to be so by the touch.

I shall afterwards endeavour to point out the way in which this original faculty of visual discernment is assisted and improved, and to discriminate what share in our perceptions of distance, as our mixed sensations and inferences are usually denominated, is owing to nature, and what to experience.

It has been already shown that outness is perceived by the sight; or, in other and more accurate language, that external objects are perceived by it as such. Now it will be allowed that the perception of even a single external object, as such, implies the perception of two of the dimensions of space. It is impossible even to conceive the separation of one of these perceptions from the other.

But the perception of outness equally includes the perception of the third dimension of space, or distance from the percipient.

If an external object can be perceived by sight as such, it must be perceived also to be distant; to stand apart, or occupy a different portion of space from the being who perceives it. It is

not in our power to conceive an object different from ourselves and yet not distant or apart from ourselves. Even when we touch objects with any part of the body, as the hand, they appear not only to be at some distance from the seat of consciousness, but to occupy a different portion of space from that occupied by the hand which touches them.

Berkeley himself acknowledged, that "some idea of distance is necessary to form the idea of a geometrical plane*," and on this ground he contended that the latter idea could not be derived from sight; in other words, that a plane could not be immediately seen.

There is, in truth, no alternative but supposing either that visible objects originally are merely internal sensations, or that they appear to the sight at *some* distance from the percipient. In proving consequently that objects are seen to be external, we have proved that they are seen to be distant.

Should it be alleged that they may appear to touch the eye, the remark will be found on consideration to be either inapplicable or absurd, accordingly as it is construed.

* Theory of Vision, sect. 155.

If objects appear to touch the eye, one of two things must be true: either they must be *felt* to touch the eye, or they must be *seen* to touch the eye. If they are *felt* to touch the eye, it is a tactual, not visual sensation, and has nothing to do with the question as to what we see: it is a sensation arising from actual contact with the physical structure of the eye, and the objects so felt to be in contact would also be felt to be at some distance from the seat of consciousness, and to occupy a portion of space distinct from that occupied by the touching membrane, as objects are felt to do when they touch any other part of the body *.

* Accordingly, it is demonstrated by physiologists, that the retina is insensible to the contact of substances perceived by the touch, and that when the eye has the sense of contact, as, for example, from a particle of dust, the sensation is owing to a distinct nerve from that of vision. "The nerve of the skin," says Sir Charles Bell, "is alone capable of giving the sense of contact, as the nerve of vision is confined to its own office." "We should keep in mind," he subsequently adds, "the interesting fact, that when surgeons perform the operation of couching, the point of the needle gives the sensation of pricking, which is an exercise of the nerve of touch, when it passes through the outer coat of the eye; but when it passes through the retina, which is the expanded nerve of vision, and forms the internal coat of the eye, it gives the

If, on the other hand, objects are *seen* to touch the eye, the spectator must see both the objects and his own eye. To see one thing touch another, we must see both of the things which are in contact. The supposition, therefore, of any one seeing an object touch his eye involves an absurdity. The same remarks will apply, *mutatis mutandis*, to the position of Dr. Adam Smith, quoted in a former section, that visible objects must be perceived as *in* the organ which perceives them. Inasmuch, then, as objects cannot be seen either to touch the eye, or to be in the eye, they must necessarily appear at some distance from it.

Thus the perception of extension in two directions, or of a plane, appears to involve in it the perception of the third dimension of space; or, to express it differently, the first perception cannot take place without the second.

The way is now cleared for adducing some positive considerations in support of the remaining point, that we originally see objects to be not only at some distance, but at various distances, and that consequently we do not, accord-

sensation as if a spark of fire had been produced. The nerve of vision is as insensible to touch, as the nerve of touch is insensible to light."— *The Hand, p.* 188, *4th edit.*

ing to the common doctrine, see them all in the same plane, or equally near; in a word, that we see geometrical solidity.

A striking argument to this effect may be derived, if I mistake not, from the recent discoveries of Professor Wheatstone in binocular vision. He has clearly shown, that when a solid object is so near to the eyes, that in order to see it the optic axes converge, a different perspective figure of it is projected on each retina. The effect of this combination is not a separate view of each figure, but a perception of a single solid object. Whenever two such different figures are projected, the one on the left and the other on the right retina, the conviction that there is an object of three dimensions in view, is irresistible. By an ingenious contrivance, Mr. Wheatstone presents to each eye a plane drawing of the perspective projection which it would receive from any given solid object, and the result is the appearance of the object single and in distinct relief, just as if the original itself were before the sight; an appearance not at all affected by the knowledge that we are really looking on two plane pictures.

Here, then, there is a certain combination of impressions on the nerves of the eyes, followed

by a perception of geometrical solidity, even contrary to the testimony of the sense of touch, proving that the perception of the third dimension of space by the sight is immediate, and independent of information acquired by any other sense.

Were a man, blind from his birth, suddenly endowed with the perfect use of both eyes, the same phenomena would ensue. When he looked at a near solid object, a different perspective picture of it would be formed on the retina of each eye, and the perception of an object of three dimensions would be doubtless produced in his mind.

On Berkeley's theory, nevertheless, the man on receiving his sight would have the same visual perception when looking at a solid object which projected a different perspective figure on each eye, and when looking at a plane representation of it which threw the same image on both eyes. The former would no more convey the impression of a third dimension than the latter. Thus, the same sensible effect would ensue from two different affections of the retinæ.

The theory has also to contend with another difficulty: it has to account for his subsequently

59645

coming to be impressed with a conviction, that he sees solidity in the one case and not in the other. It may be admitted, that while he was actually feeling the two objects with the touch, he would know that he was looking on a solid and a plane; but when, after a thousand such experiments, they were placed indiscriminately before him, and he was precluded from touching them, he would be unable to distinguish one from the other. Experience would in this case be of no use. There would be nothing in the visible appearance of either object by which they could be discriminated; nothing to which any tactual suggestion could be attached. In all cases where one thing is the exclusive sign of another, the sign must have something about it peculiar to itself; but here, by the hypothesis, the visible sign of a tangible solid would be the same as the visible sign of a tangible plane figure. The only discriminative circumstances attending the phenomena would be imperceptible to the spectator, and therefore incapable of forming links in any association.

As the man would be utterly unconscious of the projection of two different perspective figures by the tangible solid, and of only one figure by the tangible plane, these affections of the retina

could not be connected in the mind, by experience, with any impressions of tangible solidity and planeness so as to suggest them. Thus if the projection of two different perspective figures on the two retinæ did not originally engender the impression of an object of three dimensions, no process of association could possibly enable it to produce that effect.

To render the argument plainer, I have put the case of a blind man suddenly gifted with perfect sight; but the observations applied to him would equally apply to all of us. At the first moment of possessing distinct vision, if, as must be supposed on Berkeley's theory, we could not distinguish by the eye a solid figure from a plane representation of it, but saw only two plane figures, the same effect would be produced in the mind by two different combinations of impressions on the retinæ, and no experience could subsequently enable the sight to make the discrimination.

One difficulty may be raised here. A person sees geometrical solidity with one eye as well as with two. Here, then, it may be said the same perception is the effect of a single figure in the one case, and of two different figures in the other. And this is perfectly true. In all our double

organs of sense an impression on one gives the same sensation as an impression on both under certain conditions. Now the condition under which two impressions, one on each of the organs of sight, from a near solid object, give the perception of that object in relief is, that the impression made on one eye be different from the impression made on the other eye, while the condition under which the same object appears in relief to a single eye is simply, that there be one figure on the retina.

There is no incongruity, then, in the fact, however difficult it may be to explain, that a certain combination of impressions on two eyes gives the same perception as a single impression on one; but there would be an incongruity, if two different combinations of impressions gave respectively the same result; if two *different* figures, projected severally on the two retinæ, produced in the mind the same perception as two *similar* figures so projected: and this incongruity would exist if Berkeley's theory were true.

SECTION VIII.

CONTINUATION OF THE SUBJECT.

Independently, however, of any such considerations as have been hitherto adduced, we may at once come to the broad fact that we directly and intuitively see objects at various distances with as much clearness and certainty as we feel them to be so by the touch; and we have a right at present to regard this as a simple perception of which no analysis can be given. The fact itself cannot be disputed; the possibility of analysing the perception can be proved only by achieving it.

We have already seen in the preceding sections, that Berkeley's attempt to resolve it into two component elements completely failed, and it is not very hazardous to predict that any similar attempt will be followed by a similar failure.

The simple perception of visible distance, however, is liable, like all other simple perceptions, to be mingled in our minds with conceptions and inferences. In viewing various objects, as for example, an extensive landscape with hills and valleys, woods and rivers, gardens and cottages, we have a certain number of direct perceptions of different distances, but we have at

the same time a number of conceptions of intervening spaces which we cannot see, and which are suggested to our minds by the visible appearances before us. In some instances, these conceptions are mere recollections of what we have formerly seen; in others, they are inferences rapidly drawn from our familiarity with similar objects; in others, they are deliberate judgments. The nature of these conceptions and inferences, and in what respects they differ from our direct perceptions of distance, are points not difficult to explain.

1. We have in many cases a clear conviction that we actually see distances, without our being conscious of any association upon which the perception can possibly depend, or by which it can be affected. We see, in fact, the intervening space between two objects, or what may be termed the line of distance. There is a cubic block of wood, a foot square, just before my eyes. I see the faces of the cube extending one way as clearly as those extending the other. I see the depth or breadth just as well as the length. Here I am not conscious of any suggestion affecting my perception of the real relative position of the faces, or of the distance of any one line or point from another. I see the three dimensions of space.

2. In other cases I look upon objects so placed that I am unable to see the interval of space by which they are separated; and yet I perceive that they are detached from each other, and at unequal distances from myself. Looking out from the window of the room where I sit, I see a tree rising above a wall, and from the appearances of the two objects, I discern that they stand apart one beyond the other, although I can see no portion of the line of distance or of the intervening ground which separates them.

These cases in which the line of distance is concealed, although we see that the objects are unequally remote, may be subdivided into two kinds: those in which we can form no precise judgment what the intervening space is, and those in which we can form such a judgment with considerable accuracy. The instance of the wall and the tree may exemplify the first kind; a regular avenue of trees may exemplify the second. A spectator stands, we will suppose, at one end of the avenue where many of the distant trunks seem almost close together, and yet from the perspective appearances they present, he judges with some degree of precision how far they are asunder.

In the first class of cases, which I have endeavoured to elucidate by the instance of the

cubic block of wood, I am not conscious, as I have already observed, of any association, or suggestion, or inference affecting my visual perception of distance. A man born blind suddenly receiving from a surgical operation the perfect use of sight, and consequently having formed no associations with visible appearances, would probably have the same clear perception as I have of the depth of the cube, as well as of the length and breadth. There is no reason whatever for supposing that in such cases as these in which the line of distance is not concealed, although it may be seen oblique or foreshortened, the visual perception of distance depthwise is not original or intuitive; that certain points are not directly seen to be unequally remote from the spectator.

In those cases where objects are at different distances, but the line of distance is invisible, there is as little reason to doubt, that when within the range of distinct vision, and near enough to be compared, the eye intuitively perceives from the appearances presented to it that the objects are at different distances, although it cannot possibly have any intuitive perception of the ratio which such distances bear to each other, or to any definite space.

When, therefore, those appearances give the conception of a specific distance between any

two objects, there can be no question that this is what has been termed an acquired perception. In other and more accurate language it is a recollection, suggestion, or association derived from experience; or it is a judgment from similar appearances in former cases. Such is the suggestion of the distance of the trees from each other, when I look along the avenue. That one tree is further off than another is a direct and simple visual perception: that they are twelve feet or twelve yards asunder is a recollection, or inference, suggested by appearances. On appealing to my own consciousness as to the *nature of this suggestion*, I am astonished that there can ever have been any mistake about it. I find, that whenever the appearances of two objects, the intervening space between which I cannot see, suggests to my thoughts a specific distance, the conception which rises up in my mind is that of a *visible* space or line, not of a *tangible* one. The trees in the avenue, as I stand at the end of it, appear crowded together; but I have antecedently seen the spaces between them, and as I look along the vista these spaces rise to my recollection; or I have seen similar avenues, and thence form a conception of these visible spaces, and judge of their magnitude.

It is obvious that associations and inferences

of this nature become indefinitely multiplied. The eye, as it moves amongst objects, views them on all sides, and in all positions. Objects seen in one direction are afterwards, without any change in their mutually relative position, looked at in another, and their various appearances noted. The line formed by the distance between them, and presented "endwise to the eye" so as to be invisible, is viewed obliquely or laterally, and is suggested to the mind when it can no longer be seen. Peculiar visible appearances, such as the convergence or divergence of lines, distinctness of parts, and intensity of colour, become signs of definite visible spaces. Thus even supposing that we had no natural or intuitive perception of distances by the eye, or in other words, that all visible objects appeared at one uniform distance, and supposing that under such a condition the perception, as we actually have it, could be possibly acquired, the sight without the slightest assistance from the touch would soon attain the power of discerning degrees of distance by merely visible appearances. A comparison of its own impressions is all that would be required for the purpose. Berkeley's hypothesis, that visible appearances become signs of distance by association with tactual perceptions, is not only ob-

noxious to the objections already adduced, but wholly superfluous. If they are not natural signs of distance instinctively interpreted, they would become so by association with other visible appearances. If the truth of this should not at once be discerned, a short illustration will render it obvious. There are two books, for example, placed on a table right before the eye, a yard apart, and three yards from the spectator; and he of course sees the distance between them to be many times greater than their own length. He is then carried to a situation where one book is nearer to him than the other; and he marks a change in their relative position and appearance. Perhaps the two volumes, from his altered point of view, seem in contact, and the visible appearance which they now present, becomes a sign to him that they are a yard asunder, although they appear to touch. In this way visible appearances become associated with visible appearances. Instead of their being signs of tangible distances, they are signs of those visible distances which would be discerned if the eye were placed in certain situations. Here, indeed, is wide scope for the principle of suggestion or association, which must extensively operate in this way whatever may be our natural percep-

tions of visible distance. All the "attitudes of things," the relative positions of objects as seen by the eye, suggest what attitudes and positions they would assume were the spectator differently placed. It may be confidently affirmed, that if we do to a certain extent connect ideas of tangible distance and magnitude with visible appearances, we to an incomparably greater extent connect visible appearances of distance and magnitude with other visible appearances. When we see an object at a distance we do not conclude, as Berkeley says, from its visible figure and colour, and other circumstances, that if we advance forward so many paces, we shall be affected with such and such ideas of touch (or of tangible distance), but our inference is that we shall be affected with certain visual sensations, such as the enlargement and greater distinctness of the object, and the sight of intermediate things. Tangible qualities may indeed be suggested, such as solidity or smoothness, but if any ideas of tangible *distance* are suggested at all, they will be faint and indefinite, unless we have taken great pains to make them otherwise, when they will not supersede but be superadded to our visual ones.

It is not because we have *touched* the chairs,

tables, sofas, and pictures in a room, and *felt* their distances, that we know their real forms, sizes, and relative positions, under all the thousand varying perspective appearances which they exhibit as we move about the apartment; it is because we have seen the objects in a direct manner, have perhaps applied to many of the intervening spaces a direct visible measure, and have ascertained by the eye their real relations of position and magnitude.

Should it be contended, that the eye could move about amongst objects only by the aid of the muscles, and that therefore it is the muscular sensations of the limbs which give us the perceptions of distance; I reply, that motion is not necessary to the perception of distance by the eye, although it greatly assists us in the precise estimate of it; that the eye may be carried about amongst objects without any exercise of the muscles or the touch; that with infants this is obviously the case, and that motion amongst the objects themselves, while the eye remained fixed, would give the same results. And even if the assertion were true, still the knowledge of distances so acquired, although it would be in that case through the instrumentality of the muscles, would not be by the comparison and

association of tactual with visual impressions, but of visual with visual. In whatever way the eye is enabled to perceive and compare visible objects and spaces with each other, the result is independent of any association between tangible and visible qualities. When I apply a foot-rule to any object, the process is not the measuring of one tangible space by another, but of one visible space by another. It is a comparison of visible spaces or visual impressions, nor is it at all affected by any muscular efforts or motions during the operation. We shall see this more clearly illustrated in the ensuing section on magnitude.

The simple truth to be gathered from all that has been said is, that we can directly and intuitively *see* the real relative positions of lines and surfaces, which implies the perception by sight of the three dimensions of space; and we can see them with much more readiness than we can feel them by the touch. When the objects are on a small scale, we, in many cases, see these relative positions at once; when on a larger, by the eye moving over the objects, or the objects moving before the eye. When a geometrical diagram, as a triangle, is drawn on paper, we see the relative position of its lines.

When a cube of wood or ivory is held before the motionless eye, and turned about in all directions, we see the relative position of its faces.

In looking at a large surface, as the side of a room, the organ of sight by means of its muscular apparatus moves over it to see with more precision the relative position of its boundaries; and in order to perceive completely the relative position of the faces of a large fixed cubical mass, the eye may have to be carried round it by the aid of the limbs; but in neither of these cases does a recollection of the muscular effort form an element in the resulting knowledge.

In the case of large objects, both tangible and visible, when we learn the relative positions of their surfaces, there is obviously a succession of both perceptions and conceptions, and an ultimate judgment of the understanding. These bodies cannot be embraced all at once by either power of perception. Take, for instance, a cubic block of stone whose faces are two or three yards square. Neither the touch nor the sight can ascertain all at once the real form of the object. In both cases there is a series of perceptions successively turned into conceptions, and enabling the mind to draw the final in-

ference: in the one case the result is a knowledge of the relative positions of the surfaces, constituted by the remembrance of a succession of tactual perceptions; in the other, a knowledge of the relative positions of the surfaces, constituted by the remembrance of a succession of visual perceptions. In both, the senses are equally independent of each other.

It follows from the direct perception of distance by the sight, that we do not naturally see, with any accuracy or precision, the relative positions of the lines which solid objects would present if projected on a flat surface. To perceive these relative positions completely, requires the lines to be placed in the same plane, whereas we see them in various planes. We have not, as some authors assert, any natural knowledge of perspective. On the contrary, it is an unnatural effort to imagine the relative stations which objects would assume if, instead of being seen as they naturally appear separated by various spaces, they were depicted on a uniform surface. The artist has to represent on a flat surface, objects which are seen *not* to be on a flat surface; just as the sculptor imitates in marble, things which are not marble.

In looking along an avenue of trees we do

not see the relative positions in which they would appear if they were projected on a plane surface, nor do we see them standing at their actual distances: we see something different from both. We see them at various distances from ourselves, and from other objects, occupying space in all its dimensions. If you ask me to define this seeing objects occupying space in all directions, I can throw no light upon it by definition. It is a simple perception, just as simple and undefinable as feeling extension in all directions by the hand.

CHAPTER III.

EXAMINATION OF BERKELEY'S DOCTRINE ON THE PERCEPTION OF MAGNITUDE.

BERKELEY'S views regarding magnitude were unavoidably perverted by his errors regarding distance, and by his propensity to depreciate the original powers of vision.

The pith of his speculations on this subject is, that since visible magnitude is perpetually varying as objects approach or recede from us, it can be nothing determinate, and therefore tangible magnitude, which is always the same, can alone be the subject of any unambiguous reference or comparison.

"It has been shown," says he, "there are two sorts of objects apprehended by sight; each whereof hath its distinct magnitude or extension; the one properly tangible, *i. e.* to be perceived and measured by touch, and not immediately falling under the sense of seeing; the other, properly and immediately visible, by mediation of which the former is brought into

view. Each of these magnitudes are greater or lesser, according as they contain in them more or fewer points; they being made up of points or minimums. For, whatever may be said of extension in abstract, it is certain, sensible extension is not infinitely divisible. There is a *minimum tangible* and a *minimum visible*, beyond which sense cannot perceive."

"The magnitude of the object which exists without the mind, and is at a distance, continues always invariably the same; but the visible object still changing, as you approach to or recede from the tangible object, it hath no fixed or determinate greatness. Whenever, therefore, we speak of the magnitude of any thing, for instance a tree or a house, we must mean the tangible magnitude, otherwise there can be nothing steady and free from ambiguity spoken of it *."

He then endeavours to show how, by experience, the various visible appearances of an object come to suggest the tangible size, and asserts, that "when we look at an object, the tangible figure and extension thereof are principally attended to: whilst there is small heed

* Theory of Vision, sect. 54 and 55.

taken of the visible figure and magnitude, which, though more immediately perceived, do less concern us."

"An inch and a foot," he continues, "from different distances shall both exhibit the same visible magnitude, and yet at the same time you shall say, that one seems several times greater than the other. From all which it is manifest, that the judgments we make of the magnitude of objects by sight are altogether in reference to their tangible extension. Whenever we say an object is great or small, of this or that determinate measure, I say, it must be meant of the tangible and not the visible extension, which, though immediately perceived, is nevertheless little taken notice of *."

Throughout this passage, and his speculations on the subject generally, Berkeley appears to me to labour under two fundamental errors: he misapprehends the mental facts which really take place when we consider the magnitude of objects, and betrays an inadequate conception of the nature of the process designated by the words "judging of magnitudes."

His assertion, that "when we look at an

* Theory of Vision, sect. 61.

object, the tangible figure and extension thereof are principally attended to," is so far from being correct, that we may confidently affirm they are seldom if ever thought of. Let any one consult his own mind, and not only will his consciousness corroborate this affirmation, but he will be sensible of the difficulty of forming any clear conception of the tangible extension of the various objects around him, even when he purposely tries to do it — a sufficient proof in itself that the act is infrequent. What we truly think of when we look at an object at various distances with reference to its magnitude, is its visible extension compared with that of something else. Our whole conceptions, except when we endeavour to make them otherwise, are in such a case, of a visual character. An object far off generally brings to mind the appearance it would have if near at hand, and of course its magnitude in comparison with other objects equally near.

To appreciate the full force of these remarks, it is necessary to take into view also the other part of the matter inadequately conceived by Berkeley — the nature of the process of estimating magnitudes, or forming a judgment of them.

All estimates or judgments of magnitude are comparative. If we form a judgment of the tangible magnitude of some object, it is an estimate of the ratio it bears to the magnitude of something else as felt by the touch: if we form a judgment of the visible magnitude of some object, it is an estimate of the ratio it bears to the magnitude of something else as perceived by the eye. Thus comparing portions of visible extension, and comparing portions of tangible extension, are essentially the same process.

There is one difference, however, between our judgments of tangible magnitude and those of visible magnitude. Our impressions of tangible magnitude are all received from objects when they are in contact with the organ of touch, *i. e.* placed in a relation with the organ not admitting of degrees, and therefore our judgments on this point are comparisons between objects in uniform circumstances.

Our impressions of visible magnitude are, on the contrary, received from objects at a distance from the organ—a relation admitting of degrees, and our judgments therefore may be either between objects in the same circumstances, *i. e.* at the same distance; or, between objects in different circumstances, *i. e.* at different distances.

We may compare, for instance, the size of an object *A* six yards from the eye, with the size of an object B twice the distance; or we may compare *A* and B when they are equally near. The former is usually and conveniently termed a comparison of their apparent magnitudes, the latter, of their real magnitudes; but in making them there is manifestly nothing, or needs be nothing, compared or thought of but what is visible.

Hence Berkeley's reasoning, that since the visible magnitude varies, while we habitually regard the object as continuing precisely the same, we *must* have in our thoughts the tangible magnitude; both contains a conclusion at variance with facts, and is in itself inconsequential. It is obvious that we may speak rationally and intelligibly of an object continuing the same in real magnitude, while it varies in apparent, without any reference to touch, simply meaning that it continues unaltered in relation to objects at the same distance.

The phenomena of colour, where the intrusion of sensations of touch is out of the question, will perhaps best illustrate the particular point before us.

We constantly see the same object vary in

colour as it approaches or recedes, yet we habitually regard its real colour as remaining unaltered. Here is precisely the phenomenon presented by magnitude. An object varies in visible size as it approaches or recedes, and nevertheless we habitually conceive it to continue of the same dimensions.

In what sense, then, can the colour of an object be said to continue the same? The answer obviously is, "when seen at the same distance," or more generally, "under the same circumstances." In a precisely similar sense the magnitude of an object continues unaltered. And so it is with the visible world throughout. We are perpetually witnessing alterations in the colour, form, and size of every object around us, from changes in our relative position to them; but this creates no difficulty in our judgments with regard to these properties. Of all of them we come to have in our minds settled determinate estimates, and in reference to all we make the same distinction between real and apparent.

This brief explanation will enable us to see that the difficulties which Berkeley has conjured up in the following passage have no real existence.

"Inches, feet, &c." he says, "are settled stated lengths, whereby we measure objects, and esti-

mate their magnitude. We say, for example, an object appears to be six inches or six feet long. Now, that this cannot be meant of visible inches, &c. is evident, because a visible inch is itself no constant determinate magnitude, and cannot therefore serve to mark out and determine the magnitude of any other thing. Take an inch marked upon a ruler, view it successively at the distance of half a foot, a foot, and a foot and a half, &c. from the eye, at each of which, and at all the intermediate distances, the inch shall have a different visible extension, *i. e.* there shall be more or fewer points discerned in it. Now I ask, which of all these various extensions is that stated determinate one that is agreed on for a common measure of other magnitudes? No reason can be assigned why we should pitch on one more than another; and except there be some invariable determinate extension fixed on to be marked by the word inch, it is plain it can be used to little purpose; and to say a thing contains this or that number of inches, shall imply no more than that it is extended, without bringing any particular idea of that extension into the mind."

Berkeley's views necessarily led him to imagine that there is something more positive and

absolute in a tangible inch or foot than in a visible one. Take a foot-rule, and it is certainly always of the same length to the touch; but not more certainly than that it is always of the same length to the eye at the same distance from that organ: it always makes the same impression on the retina, and therefore other lengths may be judged of by it.

When we are desirous of forming definite estimates of magnitude, or, in other words, of measuring objects, we do it by the application of the instrument, the rule or measure, to the object, and of course the rule and the object being in juxta-position are at the same distance from the eye.

Measuring, as already stated, is, in reality, nothing but a process of comparison, and there is no more difficulty in comparing portions of visible extension, than portions of tangible extension. If two sticks are of unequal length, they always appear of unequal length when both are in juxta-position or at the same distance, whatever that distance may be. Seeing them to be unequal is a much readier operation than feeling them to be so, and the one is quite independent of the other.

It is obvious, then, inasmuch as all measure-

ment is comparison, that a tangible inch has no superiority over a visible inch. When we feel a tangible inch, a certain impression is made on the mind through the nerves of touch, and in applying it to other bodies we note how many similar impressions they make. When we see a visible inch, a certain impression is made on the mind through the retina, and in applying it to other bodies we also note how many similar impressions they make. Thus, in both cases, measuring is, at bottom, a comparison of nervous or sensational impressions among themselves, of which no further account can be given. The circumstance that a tangible inch always covers an equal portion of the organ of touch, while a visible inch may sometimes cover a smaller portion of the retina, and at other times a larger, can evidently make no difference. In the comparison of two magnitudes, it is all one whether the things compared are stationary in size, or diminished or enlarged, provided the diminution and enlargement are in the same ratio. If x is contained in y twelve times, these quantities will bear the same relation to each other, whether $x=6$ and $y=72$, or $x=10$ and $y=120$.

In answer then to Berkeley's question, already cited, "which of all these various extensions"

(when an inch is marked on a ruler and placed successively at various distances) "is that stated determinate one that is agreed on for a common measure of other magnitudes?" I reply, that the question implies a misconception of the process of measuring: any of them will do; but inasmuch as it is easier to use a ruler at less than arm's length than further off, one within that distance is to be preferred purely as a matter of personal or mechanical convenience. Suppose it is the length of a table that is to be ascertained: if the table is close at hand I can apply the foot-rule myself and ascertain what I wish to know; but it would be just the same thing if I saw the foot-rule applied to the table by another person at a distance, where the visible extension of the table had dwindled to one-fourth. The size of the foot-rule applied to it would have dwindled in an equal degree, and provided I could see the objects with sufficient distinctness, the result would be equally accurate and satisfactory. It is plain, too, that both these measurements would give the same result as a measurement by the touch, because all that is to be ascertained is the ratio of one quantity to another.

Berkeley's observation would have been per-

fectly correct, did not the object to be measured vary in the same ratio as that with which it is compared. It would apply to any attempt to measure the magnitudes of bodies at all temperatures, although some contracted and some expanded as they became hotter, by a metallic rod which itself regularly expanded with every addition of heat.

The author of the Theory of Vision might as well have told us that our judgments of the loudness of sounds and the strength of scents must be altogether in reference to touch. The explosion of a cannon in the street, and a thunder-clap at several miles distance, he might have said, seem equally loud, although one is in reality three or four times louder than the other. When we speak of the loudness of a sound, then, what do we mean? Do we mean its loudness at a yard from the sonorous body, or a furlong, or a mile? Which of these shall we take as the determinate one for a common measure of other sounds?

It is quite clear, that in comparing the loudness of two explosions, we may mean either their loudness when heard at the same distance from the two sources whence they proceed, or their loudness at different distances; and in both cases

our meaning will be perfectly precise. We have only to state plainly which we intend.

The case is just the same with our estimate of the strength of scents; nor is it at all different with the measurement of magnitudes perceived by the eye. In the latter instance we may compare visible objects at the same distance, or at different distances; in either case the measurement may be equally accurate, and provided we indicate clearly from which of the operations the result is obtained, there can be no misapprehension. When the real magnitude of the objects is in question, our comparison must obviously presuppose them to be equally near, as when the real loudness of the sounds issuing from different sources is in question, our comparison must imply the equal proximity of the sonorous bodies.

It is to be observed that there is a difference between Berkeley's theory as applied to distance, and as applied to magnitude. He denies that distance can be directly seen at all; affirms that to perceive it by sight is impossible in the very nature of the case; and that we imagine we see it from connecting certain tangible qualities with certain visible appearances. But he allows that magnitude is a direct object of vision; he

admits the existence of visible magnitude, while he restricts the designation of real and determinate magnitude to that which is felt by the touch. If we possessed the power of vision without the power of touch, we should, according to him, have no conception of distance; but we should see things to be greater or less although continually varying in their dimensions. Thus visible distance could have no existence independently of touch; but visible magnitude would exist without it.

CHAPTER IV.

EXAMINATION OF BERKELEY'S DOCTRINE ON THE PERCEPTION OF FIGURE.

THE inferences on the subject of figure, resulting from Berkeley's theory respecting the perception of distance, are not difficult to point out. Plane figures and the perspective figures of solid objects must be perceived by sight, if his theory were true, because they are constituted by differences of colour; but inasmuch as the third dimension of space would be invisible, solid figure, or the relative positions of the surfaces of bodies (as, for example, the faces of a cube) could not be perceived by sight but only by touch. Our visual perceptions of solid figure, or what we take to be such, must consequently be mere suggestions of tangible forms.

Hence it is evident, that Berkeley's theory does not necessarily raise any question as to the perception of *plane* figures, which, as constituted by mere diversities of colour, are obviously cognizable by sight; and it is further evident, that

the question as to the visual perception of *solid* figures is included in that respecting the perception of distance, which has been already investigated.

Berkeley, however, not content with such deductions as these, has taken occasion to throw out several curious and almost incomprehensible speculations on the subject.

Of all the doctrines, indeed, contained in his treatise on Vision, perhaps none are more difficult to comprehend, or to reconcile with each other, than those relating to visible figure.

He maintains the following propositions, amongst others:—

1. That we perceive forms or figures by the eye.

2. That figures so perceived vary in magnitude; and yet,

3. That neither solid nor plane figures are immediate objects of sight.

Thus, according to him, there is a kind of figure perceived by sight which enlarges or lessens, that is, which possesses magnitude, but which is not seen to be either plane or solid. Now as that which has magnitude must have one dimension or more; as moreover there are only three dimensions; as no figure can be con-

ceived without at least two of these; as whatever figure possesses only two is plane, and whatever figure possesses three is solid, to say that we can perceive a figure which is neither plane nor solid, but which enlarges and lessens, is to say that we can see a figure destitute of magnitude, and yet a figure acknowledged to vary in magnitude.

That this is a just representation of the doctrines respecting visible figure, contained in the Theory of Vision, will be manifest from the following passages:—

In section 127, he contends that visible and tangible figures are specifically different—and so throughout the essay, he continually speaks of figure being directly perceived by sight; as in the passage already quoted in the section on magnitude.

In section 54, he maintains that "the visible object, still changing as you approach to or recede from the tangible object, it hath no fixed or determinate greatness."

In section 158, he says, "From all which we may conclude, that planes are no more the immediate object of sight than solids. What we strictly see are not solids, nor yet planes variously coloured; they are only diversity of

colours. And some of these suggest to the mind solids, and others plane figures; just as they have been experienced to be connected with the one or the other: so that we see planes in the same way that we see solids; both being equally suggested by the immediate objects of sight, which accordingly are, themselves, denominated planes and solids: but though they are called by the same names as the things marked by them, they are, nevertheless, of a nature entirely different, as hath been demonstrated."

There is here, as may be asserted without any undue harshness, a confusion or contradiction of ideas. Berkeley himself appears to have been conscious of some perplexity of thought on this subject, or at least of his incapacity to find adequate expression for his peculiar views.

"In treating of these things," he says, "the use of language is apt to occasion some obscurity and confusion, and create in us wrong ideas: for, language being accommodated to the common notions and prejudices of men, it is scarce possible to deliver the naked and precise truth, without great circumlocution, impropriety, and (to an unwary reader) seeming contradictions; I do therefore, once for all,

desire, whoever shall think it worth his while to understand what I have written concerning vision, that he would not stick in this or that phrase or manner of expression, but candidly collect my meaning from the whole sum and tenor of my discourse; and, laying aside the words as much as possible, consider the bare notions themselves, and then judge whether they are agreeable to truth and his own experience, or no *."

Endeavouring, in the spirit here recommended, to collect the author's meaning when he affirms that the figures which we see are neither plane nor solid, it appears to me to be a part or consequence of his doctrine already examined, which asserts that visible objects are only internal feelings. From this it is an inevitable inference that plane and solid figures cannot be the objects of sight, as a plane and a solid equally imply something external. "Some idea of distance," Berkeley himself says, "is necessary to form the idea of a geometrical plane." Hence his hypothetical intelligent being, whom he supposes to be gifted with sight without the sense of touch, "cannot," he contends, "even

* Sect. 120.

have an idea of plane figures any more than he can of solids."

Although this doctrine about visible figures being neither plane nor solid is thus consistent with his assertion that they are internal feelings, it is in itself contradictory.

As visible objects have, both necessarily and by his own admission, figure and magnitude, they must be apprehended as either plane or solid: it is impossible even to conceive them otherwise. Magnitude implies or is identical with extension, and figured magnitude must extend in two or more directions: *i. e.*, must be either plane or solid.

Consistently with the assertion that plane and solid figures cannot be perceived by sight, Berkeley maintains that geometry is not concerned with visible figure. His reasons, however, are in themselves fallacious.

"All," says he, "that is properly perceived by the visive faculty, amounts to no more than colours with their variations, and different proportions of light and shade: but the perpetual mutability and fleetingness of those immediate objects of sight, render them incapable of being managed after the manner of geometrical figures; nor is it in any degree useful that they should.

It is true, there are divers of them perceived at once; and more of some, and less of others: but accurately to compute their magnitude, and assign precise determinate proportions between things so variable and inconstant, if we suppose it possible to be done, must yet be a very trifling and insignificant labour *."

It is quite true, that if we could not see distance, all that we perceived by sight would be coloured forms, which, as they really receded or approached, would alter in size, or shape, or both, to the eye, although we should not be able to discover by that organ alone the cause of the alteration. But the hypothetical being, whom Berkeley introduces as gifted with sight but not with touch, would unquestionably see geometrical solidity; and even if he were incapable of thus perceiving the third dimension of space, he still might learn some at least of the properties of plane figures, inasmuch as he would be able to distinguish such figures in all their varieties, rectilineal and curved. In either case, even the most incessant changes in the sizes and shapes of objects would not affect his knowledge of the relations of bounded space acquired by

* Sect. 156.

means of the forms presented to his sight, any more than the extinguishing of a fire would deprive an observer of his previously acquired ideas of the properties of heat.

Berkeley argues as if the truths of geometry, or our knowledge of the relations of bounded space, depended on the stability of actual objects in regard to their figures and dimensions; as if those relations could not be ascertained, because particular objects might appear to vary in shape and magnitude. All, however, that would be necessary for acquiring the truths of geometry, are a few simple ideas, such as those of surfaces, lines, and points. These having been obtained, the varying sizes and forms of particular objects would be perfectly immaterial. How far Berkeley's hypothetical intelligence, already alluded to, might be able to carry his geometrical reasonings, if he could neither see nor conceive the third dimension of space, it would be difficult to say, and perhaps not very useful to inquire, inasmuch as the supposed condition is in the nature of the case impossible. He certainly, as Berkeley himself remarks, would be unable "to conceive the placing of one plane or angle on another, since that supposeth some idea of distance;" and if it is true, that "the

superposition of triangles is the groundwork of all our geometrical reasonings concerning the relations which different spaces bear to one another in respect of magnitude *," his progress in that science would be very limited. It is, nevertheless, a question still open to controversy, whether this ideal superposition could not be dispensed with, and the same truths, or some of them at least, arrived at by a different method.

However this may be, it is obvious that Berkeley was mistaken in denying that the perception of visible figures alone would enable us to learn the real relations of their lines and surfaces in respect of position and magnitude; and he was strangely wrong in supposing that the mutability of these appearances would form an insuperable impediment to any progress in geometrical science.

Some of the language employed by Berkeley on the subject of figure almost implies the doctrine more recently maintained by Dr. Thomas Brown, that figure is not an object of sight, or to express it differently, that the unassisted eye sees only colours, and has no perception of forms.

* Stewart's Elements, vol. ii, p. 207.

That such was not Berkeley's meaning, in many parts of his essay, the preceding exposition has sufficed to show. It is, nevertheless, difficult to put any other construction on some of the expressions in the following passage:—

"It is a prevailing opinion, even amongst those who have thought and writ most accurately concerning our ideas, and the ways whereby they enter the understanding, that something more is perceived by sight than barely light and colours, with their variations. Mr. Locke termeth sight 'the most comprehensive of all our senses, conveying to our minds the ideas of light and colours, which are peculiar only to that sense; and also the far different ideas of space, figure, and motion.'—(Essay on the Human Understanding, lxii, c. ix, sect. 9.) Space, or distance, we have shown is no otherwise the object of sight than of hearing. *And as for figure and extension, I leave it to any one that shall calmly attend to his own clear and distinct ideas, to decide whether he has any idea intromitted immediately and properly by sight, save only light and colours:* or whether it be possible for him to frame in his mind a distinct abstract idea of visible extension, or figure, exclusive of all colour; and, on the other hand, whether he can conceive colour without visible

extension? For my own part, I must confess, I am not able to attain so great a nicety of abstraction; in a strict sense, I see nothing but light and colours, with their several shades and variations. He who, beside these, doth also perceive by sight ideas far different and distinct from them hath that faculty in a degree more perfect and comprehensive than I can pretend to. It must be owned, that by the mediation of light and colours other far different ideas are suggested to my mind; but so they are by hearing, which, beside sounds which are peculiar to that sense, doth by their mediation suggest not only space, figure, and motion, but also all other ideas whatsoever that can be signified by words *."

This passage (which appears to me, I confess, to contain some obscure as well as inconsistent positions), taken in conjunction with the other already cited, in which he declares that "what we strictly see are not solids nor yet planes variously coloured, they are only diversity of colours," renders it difficult to clear him from the charge of having maintained the incapacity of the sight to distinguish figures.

The clause in the above quotation, which I have marked with Italics, seems almost a direct

* Sect. 130.

assertion of that doctrine, and the passage previously cited contains it by implication; for, as he takes away from sight the power of seeing both solid and plane figures, it is obvious there can be no figures left for it to see.

On the whole, it is not quite clear whether he intended in the latter part of his essay to assert the doctrine in question, from that increasing boldness of speculation which I think is to be observed as he advances in his theme, or fell into the inconsistencies manifest in his language from a real confusion of ideas, or want of complete mastery over a subject so subtile and abstruse in its nature, so new at that time to speculation, and consequently so difficult to handle with precision. Whichever of these suppositions be correct, it may be well, perhaps, before dismissing the topic, to advert to the shape it has assumed in the hands of Dr. Brown, who contends at considerable length that figure is not immediately perceived by sight; that the original sensations of colour do not in any case involve the perception of definite outline, but that colour is perceived by us as *figured*, only in consequence of being blended by intimate associations with the feelings commonly ascribed to touch *.

* Lectures, vol. ii, p. 100.

It is unnecessary to attempt to expose at length the fallacy of the arguments by which this doctrine is supported, for most of the considerations already urged in the preceding part of this essay against the theory, that the visual perception of distance arises from the suggestion of tactual experience, will apply, *à fortiori*, against the proposition immediately before us. No such suggestion, in a word, takes place; and if it did, it could not produce the visual perception, or the strong belief of visual perception, ascribed to it.

But there is an additional argument against Dr. Brown's position, not applicable to the theory of invisible distance, and which alone is sufficient to prove it wholly untenable, not to say completely absurd. An association is a connection established between at least two things. In Berkeley's theory, accordingly, an association is asserted to take place between certain appearances on the one hand, and certain tangible distances on the other; but in Dr. Brown's theory now under review, there is only one thing to be associated, *viz.* tangible figure; there is no second thing to be associated with it. Provided we have both a visible figure and a tangible figure to begin with, there may be an association between them. The visible figure of an orange may from

association suggest the tangible figure, but if there is no visible figure at the outset, there is nothing to which the tangible figure can be joined; there is no hook, if I may so express it, on which the tangible figure can be hung.

"Dr. Brown's theory," it may perhaps be said, "*does* assign another thing, *viz.* colour. As the peculiar smell of the orange suggests the idea of the taste and other qualities of the fruit, so the peculiar colour of the orange suggests its tangible figure." And if the colour were indeed *peculiar* to the tangible figure of the orange, there can be no doubt it might; but as the same colour is exhibited by innumerable tangible forms, the *mere* colour cannot suggest the tangible form of the orange, except by accident. If it could, half an orange might appear as a whole orange, and even a fragment of the peel as a complete sphere.

This oversight on the part of Dr. Brown is the more remarkable, inasmuch as he himself had just before laid down the very principle, which I have here insisted upon as fatal to his theory of the original invisibility of figure.

"Some diversity," he asserts in the passage alluded to, "there evidently must be of the immediate sensation of sight, or of other feelings coexisting with it, when a difference of magnitude

or *figure* is suggested; the visual affection which is followed by the notion of a mile cannot be the same as that which is attended with the notion of half a foot; nor that which is attended with the perception of a sphere be the same as that which suggests a plane circular surface. *Whatever the number of the varied suggestions of this kind may be, there must be at least an equal variety of the immediate sensations that give rise to them* *."

To sum up. The scope of Berkeley's doctrine is to show that although we can see figures, inasmuch as we can see one coloured space bounded by another, yet we cannot see *plane* figures any more than solids; that what we see are mutable varieties of colour, from the perception of which we could make no advance in geometrical science if not assisted by touch to perceive distance, or the third dimension of space.

The true account, on the other hand, is simply this: that as we can perceive distance directly and intuitively by the eye, so we can directly and intuitively see both plane and solid figures, or, in other words, we can see lines and surfaces in their true relations both of magnitude and posi-

* Vol. ii, p. 68. An able refutation of Dr. Brown's theory of Visible Figure has just appeared in Mr. Whewell's "Philosophy of the Inductive Sciences," vol. i, p. 289.

tion; and that there is not a single geometrical truth which may not be learned by means of the sight, independently of the sense of touch.

In fact, the whole of Berkeley's doctrine on the theory of vision consists in denying this. There cannot be given a more succinct view of his entire theory than by putting it in this form. It is impossible, according to him, to see the real relative position of lines and surfaces, and their true ratio respectively to each other; in other words, we cannot see either real magnitude or solid figure, or even plane figure; all which positions, as we have seen, are exactly the reverse of the truth.

CHAPTER V.

EXAMINATION OF EXTERNAL FACTS, NOT ADVERTED TO BY BERKELEY, BEARING ON THE THEORY OF VISION.

BESIDES our own consciousness, to the phenomena of which our attention has been chiefly confined in the preceding disquisitions, there are three other sources whence we may derive facts to try the validity of the conclusions to which, on the subject before us, we may have been led; sources which Berkeley has altogether neglected. These are the indications of visual perception presented, 1st. By the young of the lower animals; 2dly. By the young of the human race; 3dly. By blind persons on receiving their sight*: and to the

* At the date of Berkeley's Essay, I am not aware that any authentic cases of blind persons having been restored to sight by surgical operations were on record. In regard to the other two sources of information, I can find only a solitary passage in which he alludes to them. "We are not to think," he says, "that brutes and children, or even grown reasonable men, whenever they perceive an object to approach or depart from them, do it by virtue of geometry and demonstration."—*Theory of Vision, sect.* 24.

examination of these the course of our inquiry has now conducted us.

The issue to be tried by this appeal to external facts might be properly limited to distance alone, because any questions as to magnitude or figure, which are not included in that regarding distance, must be essentially matters of mere explanation, and can scarcely be affected by evidence. Such questions, nevertheless, will be noticed as they incidentally arise in the proposed investigation.

SECTION I.

ON THE POWER OF VISUAL PERCEPTION, MANIFESTED BY THE YOUNG OF THE LOWER ANIMALS AND OF THE HUMAN RACE.

The evidence furnished by the actions of the lower animals, in reference to the subject before us, is complete and conclusive. Unless we could throw our souls into their bodies, according to the fable, and feel all which they experience, the proof furnished by the movements of many of them immediately after birth that objects may at once be perceived by sight to be at different distances, could not be more satisfactory than it actually stands. Their running about, their

snatching at objects presented to them as soon as born, their seeking the teats of the dam, their leaping from one spot to another with the greatest precision, all show not only that they can see objects to be at different distances, but that there is a natural consent of action between their limbs and their eyes, that they can proportion their muscular efforts to visible distances. They move their limbs over spaces, and plant their feet on spots previously perceived by the sight, and arrive at the objects which, in consequence of having seen them, they wish to touch or grasp. To cite once more the instance mentioned by Sir Humphrey Davy, "the crocodile bites at a stick, if presented to it, the moment it is hatched." It is stated by Cuvier that the ape, although it remains hanging to the breasts of its mother during the first days of its existence, looks attentively at all objects without touching them, and that subsequently from its first movements it shows a very exact *coup d'œil* every time it has occasion to leap, or to seize hold of any thing *.

* In another passage of his works, quoted by Mr. Stewart in his Elements, vol. iii, p. 508, Cuvier says, "Plusieurs de ces animaux, en paroissant à la lumière, voient de suite les objets hors de leurs yeux, et même à leur distance réelle ; ils les fuient, les évitent, et se conduissent à leur égard comme si un long usage eût consommè leur expérience."

Here then we have positive proof that a perception of degrees of distance is immediately possessed at birth through the unassisted organs of vision—through organs constructed in all respects essential to the present argument like the human eye.

About these facts, which might be indefinitely multiplied, there is no question amongst either naturalists or philosophers; the controversy is about the inferences to be deduced from them. Dugald Stewart, a determined advocate and admirer of the Berkeleian doctrine, adduces similar instances of immediate visual perceptions amongst the lower animals while denying that they affect the theory of vision in human beings in the slightest degree, avowedly on the ground that the brutes derive from instinct a knowledge of many things which man learns from experience alone. He remarks, that nature "has left man to make many acquisitions for himself which she has imparted immediately to the brutes," adding, "a remarkable and indisputable instance of this occurs in that instinctive perception of distance from the eye, which in many tribes of brutes is connate with their birth, compared with what is known to take place in our own species*."

* Philosophy of the Human Mind, vol. iii, p. 338.

But this is not a just representation of the argument, or at least it leads to an erroneous conception of the theory of vision, as stated by its original author. Berkeley does not seek to establish his theory by appealing to the process which actually takes place in the human infant, and showing that the child gradually learns through the instrumentality of the touch, what is immediately distinguished by the eye of the brute; but he endeavours to prove his doctrine by considerations which are directed against the essential capabilities of the sense of sight itself, whether seated in man or the lower animals. He contends that "distance of itself and immediately cannot be seen, inasmuch as being a line directed endwise to the eye, it projects only one point in the fund of the eye, which point remains invariably the same, whether the distance be longer or shorter;" an argument which, if it has any meaning and any force at all, must establish the impossibility of distance being perceived by such an organ as the eye in any living body whatever, human or brute, and which is therefore conclusively answered, when a single instance is produced in which an animal possessing that organ shows unequivocal signs, immediately after birth, of seeing objects to be at various distances from itself.

Against Berkeley himself, consequently, the facts stated in the present section are decisive; while they still leave the question, "whether man does actually differ from other animals in not possessing the faculty of directly and intuitively seeing distance, or of seeing it at all except by means of the touch," to be determined by an examination of his actions in the earliest stage of his existence. On this point, nevertheless, the instances cited afford a strong presumption against the theory under review.

If the eye in these animals is an organ capable of the direct and intuitive perception of distance, it forms a probable ground for concluding that such is the natural function of the organ wherever found.

It is doubtless an admitted fact, that infants have not immediately after birth that perfect perception of distance which is exhibited in such instances as have been here adduced. But as this defect of power in the eye extends also to the perception of colour and figure, where it is evidently owing to the immaturity of the organ, there is no reason why it should not be attributed in the case of distance to the same cause.

Nor is this want of functional power confined to

the eye. In regard to all the senses, as well as limbs and faculties generally, the human race at birth are placed in the same disadvantageous condition, compared with many of the lower animals, as they are in regard to the sight. While the brute is almost instantly endowed with the use of his senses, muscles, nerves, and brain, the helpless offspring of man is scarcely in the enjoyment of any of them. It is usually said that he has to learn gradually the use of his senses, but more accurately speaking, his senses are of gradual growth. He is not born with complete powers which merely require exercise; he has not at once the capability to see, hear, touch, taste, and smell, so that all which is wanted is the exercise and training of these ready-made capacities. On the contrary, all these senses are organically immature; their physical apparatus is feeble and destitute of firmness of texture, and it must grow and be strengthened for weeks and months, and perhaps years, before the senses themselves can be in a state of full efficiency and perfection. It is not, therefore, merely because he exercises his sight and hearing every day, that he daily sees and hears better, but also because nature every day developes and strengthens the apparatus of nerves,

muscles, and brain by other means, without which exercise could do little, although it has doubtless a share in facilitating the development of these several parts and organs.

From this it follows, that imperfection in the action or functions of any of these organs at birth, or while they are in a state of progression, is no proof that the function is not natural to the organ, and would not be performed independently of experience. For example, in the infant the muscles of the legs are first weak and incapable of supporting the body or enabling it to move, while the correspondent muscles in the new-born young of many of the lower animals are sufficiently developed for both purposes; but when the limbs of the child have grown to the proper degree of firmness and consistence, their muscles are as capable of the described functions as those of the inferior race. The power of perfectly performing the functions of a muscle is an essential condition of its maturity in a natural state.

The same is true of the organs of sense, and amongst the rest, of the eye, including the nervous apparatus connected with it. The power of performing all the functions of sight is in the eye as soon as it has come to maturity. One

of the main functions of the eye is to give us cognizance of the proximity or distance of external bodies within a certain range, and as we find the eyes of many of the lower animals in possession of this power from the first moment of their existence, if the same is not manifested at once by the human infant, the presumption is not against the power being a natural function, but that the imperfection is due to the immaturity of the organ.

To recapitulate what has been now urged.

The manifestation of an immediate power of perceiving distance in the eyes of the lower animals at birth, while it is a complete answer to Berkeley's fundamental argument already cited, forms a probable reason for concluding the power to be natural to all organs of sight, and amongst the rest to those of man in a state of maturity.

Nor is this conclusion at all invalidated in any case by the circumstance that this power is not immediately manifested by the eye at birth, inasmuch as in that particular it only resembles other functions which are admitted to be natural to their respective organs when fully developed.

Thus, in human beings, the comparatively late

manifestation of the power of perceiving distance by the eye, forms no ground for calling in question the general presumption afforded by the case of the lower animals, that the faculty is natural and instinctive.

But there is a further consideration to be attended to. The Berkeleian, we must recollect, maintains that the sight is in this matter the pupil of the touch. If we were to admit, therefore, that the non-congenital development of the powers of the eye in human beings is unfavourable to the supposition of the intuitive perception of visible distance, still, before he could avail himself of this argument, he would have to show that the touch is not in the self-same predicament as the sight: he must prove it, by precise and positive evidence, to be in a condition to play the preceptor. This has not hitherto been attempted. That it cannot be accomplished I shall endeavour to render manifest, by an examination of the particular phenomena presented by the development of both these senses in the infant.

SECTION II.

ON THE DEVELOPMENT OF THE SENSES OF SIGHT AND TOUCH IN THE YOUNG OF THE HUMAN RACE.

We learn from physiologists and mothers the following facts relative to the development of the senses in infancy.

1. The new-born infant opens his eyes as soon as he has made a profound inspiration and begun to cry. A short time after birth he seeks the light, first by turning the head, then by directing the eyes towards it. At the commencement of the second month he spontaneously directs his eyes towards objects, and learns to know their forms.

2. During the first weeks the sense of taste remains obtuse.

3. It is only at the second month that the general sensibility of the smell manifests itself.

4. He hears about a week after birth, but while he attains determinate intuitions by sight, his hearing remains limited till towards the third month to the general sensation of sound.

5. The organs of touch are those which remain inert the greatest length of time *.

* Vide "Traité de Physiologie, par C. F. Burdach, traduit de l'allemand, par A. J. L. Jourdan, tome quatrieme, p. 399, *et seq.*

"At six weeks old," says a writer on Education, "the child is yet a stranger in the world; nothing exists distinctly in its mind; it has not yet found out that the objects which it sees are the same as those which it touches; and whatever impression these objects may have made on its senses, it makes no effort either to obtain or to avoid them. But even now, though its senses are far from being fully developed, it is interested by the human face; and before its attention can be attracted by any material object, it is excited by sympathy. A look of affection — a caressing tone — will win a smile from its lips; gentle emotions evidently animate the little creature, and we recognise with delight the expression of these emotions on its countenance *."

"Five or six months pass away" (continues the same writer) "before the infant has any idea of using his hands. Their destination is yet unknown to him, and the tardiness with which the discovery is made, proves that it is the slow result of experience. Long before this time he looks at objects, and shows an interest in people, and thus appears to have received

* Progressive Education, from the French of Mme. Necker de Saussure, vol. i, p. 54.

more immediately the use of the organ of sight. But we may easily observe the progress of experience in the manner in which he learns to use the sense of feeling. This has, indeed, for some time been exercised involuntarily, but it is long in being subjected to the will; it must be roused into action by the sight; and the two senses are afterwards of mutual assistance to each other.

"Let us consider how this is accomplished. As soon as an infant is able to observe at all, he begins to feel amusement. At first his smiles are excited only by the faces around him; but in a little while he begins to appear pleased with every thing that attracts his sight. The pleasure of looking at any thing bright and shining excites his feelings; he flutters in his nurse's arms, stretches out his hands, and often accidentally touches the object of his attention. This occasions an unexpected sensation; he is astonished to meet with an obstacle which arrests his movements; but after finding, for some time, that the recurrence of the same cause always produces the same effect, he learns to foresee the consequences of his own motions. Then he begins to stretch out his little hands intentionally; though, as he is not able to calculate

distances, it is still a chance whether he reaches the desired object. By constant practice he becomes, indeed, more skilful; but it is seldom that an infant is able to touch any object with certainty before he is seven or eight months old *."

"At about eight or nine months old," observes the same writer, "he has become so skilful in this respect, that he is hardly ever deceived as to the distance of objects within his reach †."

"The hand," says Sir Charles Bell, "which is to become the instrument for perfecting the other senses and developing the endowments of the mind itself, is in the infant absolutely powerless ‡." He subsequently adds, "the hand very slowly acquires the sense of touch, and many ineffectual efforts may be observed in the arms and fingers of the child, before the direction of objects or their distance is ascertained §."

From these representations it appears that the sight is really the first of the two senses in question which developes itself; that, in par-

* Progressive Education, from the French of Mme. Necker de Saussure, vol. i, p. 58.

† Ibid., p. 56.

‡ The Hand, its Mechanism, &c., p. 228, 4th edit.

§ Ibid., p. 230.

ticular, the infant begins learning to know the forms of objects at the commencement of the second month, while five or six months pass away before he has any idea of using his hands. Long before this he is sensible of the smiles of his mother or nurse; he shows an interest in the human face, which manifestly implies that he perceives objects by his sight to be at some distance from him; and, as he is carried about among them, or they move before his eyes, it is impossible to imagine that he has not some perceptions, more or less definite, of their relative distances and magnitude. It would be a monstrous supposition, that during these four or five months, in which he has been scrutinising objects by the eye, with all their lights and shades, their motions and mutual interceptions, and changing aspects, antecedently to any assistance from touch, he should have an impression that they were all equally near or equally remote. When, after all this experience of visible forms and motions, he at length begins to use his hands, he instinctively tries to touch what he sees, in which effort he at first frequently fails; but in a very short time, before he is ten months old, he has acquired the power of doing it with certainty. In these at-

tempts he is obviously learning how to adjust his muscular efforts to visible distances. He sees the object, and tries to proportion his exertions to the distance at which it appears. Here is no process of learning to see with precision by the help of the touch, but one of learning to touch with precision by the help of the sight. It is, in some respects, the reverse case to that of the blind man who receives his sight from a surgical operation. The latter has his mind stored with ideas of tangible properties of all sorts, and amongst the rest of tangible distance, form, and magnitude; and when he is admitted to the visible world, he has to learn to connect his new visual with his old tactual perceptions. The infant, on the other hand, has been for four or five months busily engaged in looking at visible forms at various distances, in motion or at rest, without the power of handling them; and when, at the expiration of that period, he begins to use his hands, his task is to learn to connect his new tactual with his old visual perceptions.

In both cases, nevertheless, as will be manifest on reflection, the very attempt to touch or seize any object, in consequence of its visible appearance, implies that the object is seen at

some distance or other, and that this distance is not the same as that at which either of the parties sees his own hand. The child, for instance, in his repeated attempts is necessarily guided by seeing the relative position of his hand and the object. If, in his first trial, he stretches out his hand too much to the left, or not sufficiently far, he can judge of the nature and extent of his failure only by seeing the space between the two visible things which he is desirous to bring into contact; and when at length he has succeeded in his desire, he can judge of his success only by his sight.

Thus the very process of learning the tangible distances, forms, magnitudes, and other qualities of the objects he sees, presupposes those perceptions of visible distance, which have been represented as arising from the exercise of the touch.

It seems undoubted, that at first, in the human infant, the impressions of all the senses are vague. The various impressions of the same sense are not very clearly distinguished from each other; but the vagueness gradually passes away, and as the impressions assume more or less of distinctness there must be some sort of feeling of their comparative intensity and other properties in the

mind of the child. Now, when he has arrived at the period of using his hands, his visual perceptions must have attained to something of this distinctness amongst themselves, while his tactual perceptions, particularly those of distance, form, and magnitude are yet vague and indefinite. Of two different visible magnitudes he will probably be sensible that one is larger than the other, while two tangible magnitudes equally different will not be discriminated by his touch. Thus it is not uncommon to see a child grasp objects in his hands and try to put them into his mouth, when they are far too large for the aperture, his tactual discrimination not being sufficient to appreciate the relative magnitude of the object and of his own mouth, the visible size of which he is not yet acquainted with. In the progress of the human infant, then, it is clear that the priority of definite perceptions of extension is with the sight, and that in the connection which is soon established between his visual and tactual sensations, the process is so far the reverse of what Berkeley's theory requires it to be, that visual perceptions of distance precede and are implied in the effort to adjust the action of the muscles so as to reach visible objects.

SECTION III.

ON THE VISUAL PERCEPTIONS OF PERSONS RELIEVED FROM BLINDNESS: CASE RELATED BY CHESELDEN.

Perhaps the most interesting source whence to obtain light on the subject before us, is that which we find in the accounts of persons who have been restored to sight, or more accurately speaking, rescued from blindness by surgical operations. Of this source, if Berkeley had any access to it, he did not avail himself. I have already stated that I am not aware whether any such accounts, deserving confidence, had appeared at the time he wrote. His essay came out in 1709, and it is not unworthy of remark, that the Tatler, of August 16, in the same year (No. 55), contains the story of a young man born blind, who on the 29th of June preceding had received his sight from a surgical operation at the age of twenty. The narrative is too loose and meagre for the purpose of the present inquiry. From an extract, nevertheless, which I have given in a note*, it will be seen, that the

* The young man's name was William Jones. "When the patient," says the narrative, "first received the dawn of light, there appeared such an extasy in his action, that he

little to be gathered from it, is in favour of the immediate visibility of distance.

The celebrated narrative of Cheselden appeared in 1728, in the Transactions of the Royal Society, and could hardly fail to become known to all the philosophers of that day. I cannot find, however, that Berkeley ever noticed either that or the account in the Tatler as corroborative of his own views. Four years subsequent to the last date (*viz.* in 1732), when he published his Minute Philosopher, he re-

seemed ready to swoon away in the surprise of joy and wonder. The surgeon stood before him with his instruments in his hands. The young man observed him from head to foot, after which he surveyed himself as carefully, and seemed to compare him to himself; and observing both their hands, seemed to think they were exactly alike, except the instruments, which he took for parts of his hands."

There were affidavits made of this case: Jones himself swore, "that he was so blind that he never saw any human face till the twentieth year of his age, when being couched, he was, in five minutes, brought to his sight, which he had at that time so well, as to see the sand run in a glass, or any thing in common."

The operator himself published a narrative of the case, entitled, "A full and true Account of a miraculous Cure of a Young Man in Newington, who was born blind, and was in five minutes brought to perfect sight by Mr. Roger Grant, oculist." 8vo. 1709.

stated his theory almost in the same terms as he had employed twenty-three years before in the original essay; but these interesting cases (one of them, at least, strongly bearing on his speculations), which in the interval had been laid before the public, he passes over in perfect silence.

Since that period several cases, equally important with the one detailed by Cheselden, have been recorded in the Philosophical Transactions, or elsewhere, by the eminent surgeons Home, Ware, and Wardrop. With regard to all these it will be instructive to examine what light they really throw on the present question. It has been already shown that the narrative of Cheselden, so often referred to by physiologists and metaphysicians, is in direct contradiction to Berkeley's doctrine that objects are not immediately perceived by the eye to be external. We have now to examine how far this and the subsequent accounts confirm or invalidate his theory on other points connected with the perception of visible objects, and particularly how far they prove or disprove the two positions: 1st. That objects are not originally perceived to be at different distances by the sight. 2dly. That the eye learns to discern that they are at different distances by the assistance of the touch.

On investigating these accounts, we find that in the evidence which particularly bears upon the first point in question, they are discordant.

Cheselden and Home each adduce an instance in which the patient, after receiving his sight from an operation, used language supposed to imply that he could not see objects to be at different distances, asserting, in fact, that objects appeared to touch his eye.

In a second instance, brought forward by Mr. Home, the patient being asked, "whether objects seemed to touch his eye," said, "No."

Mr. Ware relates a case, in which the patient also did not apprehend that objects touched his eye, but on the contrary perceived them to be at some distance. In the cases recorded by Mr. Wardrop, the testimony is to the same effect.

Here, then, we have apparently conflicting evidence, and it will be necessary to enter upon a more particular examination of each case in order to determine what is the import and weight of the testimony, and what are the legitimate inferences to be drawn from the facts adduced.

The narrative of Cheselden, which has been so celebrated and thought to be so conclusive, ap-

pears to me, I confess, exceedingly loose, meagre, and unsatisfactory. His testimony regarding the inability of the boy to perceive distances, although it may seem on a first view precise and confirmatory of Berkeley's theory, will be found, upon a close examination, to be in reality neither the one nor the other.

"When he first saw," says the narrative, "he was so far from making any judgment about distances, that he thought all objects whatever touched his eyes (as he expressed it) as what he felt did his skin; and thought no objects so agreeable as those which were smooth and regular, though he could form no judgment of their shape, or guess what it was in any object that was pleasing to him. He knew not the shape of any thing, nor any one thing from another, however different in shape or magnitude *."

What is the value of the phrase, "he thought all objects whatever touched his eyes," has been discussed in a former part of this essay, where I endeavoured to show that the expression is either absurd, or to be considered as denoting a mere tactual sensation with which the sight has no concern.

Dugald Stewart, in allusion to the expression,

* Philosophical Transactions, No. 402.

says, "It seems to me inconceivable that Cheselden could have meant this last phrase to be interpreted literally, for the thing which it implies is altogether impossible. The most obvious meaning which the words convey is, that the objects seemed to be *contiguous to, or in contact with, the cornea;* whereas the truth is, that the office of the *cornea* is merely to transmit the rays to the *retina*, which it does without itself receiving any sensible impression of which we are conscious *."

He then quotes a passage from Adam Smith, who remarks, in reference to the same phrase, "When the young gentleman said that the objects which he saw touched his eyes, he certainly could not mean that they pressed upon or resisted his eyes, for the objects of sight never act upon the organ in any way that resembles pressure or resistance. He could mean no more than that they were close upon his eyes, or to speak more properly, perhaps, that they were in his eyes †."

This explanation is certainly no great improvement on Cheselden's own statement. Mr. Stewart very justly objects to it, that a moderate light on the retina is not accompanied

* Elements of the Philosophy of the Human Mind, vol. iii, p. 413.

† Essay on the External Senses.

with any perception of the part of the body on which the impression is made; and he might have added, that it is impossible for the eye to see any thing *in* itself, inasmuch as that implies a sight *of* itself. Besides, Dr. Smith's explanation is inconsistent with the boy's own comparison: "he thought all objects touched his eyes, as what he felt did his skin;" which is expressly asserting that the objects were perceived to be external to the eyes.

Mr. Stewart then proceeds to give his opinion, that the impression which the boy described by the phrase is to be resolved into the pain produced in the first instance by the admission of light.

"Where the light," says Mr. Stewart, "is so powerful as to produce *pain*, a sensation of *touch* is united with the proper sensations of *sight*, and it is characteristical of all sensations of *touch*, that they are accompanied with a perception of the *local situation* of their exciting causes. This, however, it is well known does not take place with respect to the sensations of smell and sound; nor do I imagine it to take place, prior to experience, with respect to the sensations received by the eye. And therefore, if a patient under such circumstances should be led by his first visual

perceptions to connect them *locally* with the organ by which they are perceived, I should be inclined rather to ascribe this to concomitant feelings of *pain* (produced by the recent operation, or by the too sudden impression of a strong light) than to any of those sensations which are exclusively appropriated to the sense of sight *."

Mr. Stewart's view of the case is confirmed by the discoveries of modern physiologists. "The beauty and perfection of the system," says Sir Charles Bell, "is, that each nerve is made susceptible to its peculiar impression only. The nerve of the skin is alone capable of giving the sense of contact, as the nerve of vision is confined to its own office." "It is most beneficently provided that this nerve (of vision) shall not be sensible to pain, nor be capable of conveying to the mind any impressions but those which operate according to its proper function, producing light and colour. The pain experienced in the eye, as from the irritation of dust, is owing to a distinct nerve from that which bestows vision †."

Hence it appears that any sensation or impression of contact could not be an affection of the

* Elements of the Philosophy of the Human Mind, vol. iii, p. 413.

† The Hand, p. 187, 4th edit.

sight. The thing is not only absurd in itself, but contradicted by our knowledge of the structure of the organ.

In the remarks above quoted, Mr. Stewart has, I conceive, satisfactorily accounted for the boy's language; but even supposing this explanation to be unfounded, and that the boy intended to describe, as well as he could, a purely visual sensation, we may easily conceive how he might be led to employ the phrase he did, if we reflect that his only mode of becoming acquainted with the definite forms of objects and their distances had all his life been by the touch. Whatever objects he learned to know, whatever extended substances he perceived, it was by means of actual contact between some part of his body and them, and when he had acquired an additional power of perception, he might naturally think, in the first flush of novelty, that the objects of the new sense were perceived in some analogous way. In seeking to express his novel feelings by the aid of analogical language (the only resource he would have), this might be the analogy which his new sensations would most readily suggest. Moreover, it is by no means implied in this expression that he regarded visible objects to be all equally near. There is certainly no such implication in

likening his new power to the sense of touch, to that sense by which alone he had been accustomed to *feel* objects to be at different distances from himself.

Whichever of these explanations we adopt, it is obvious that a phrase so ambiguous and indefinite can afford no support to the Berkeleian theory; but it is conjoined, as the reader will observe, with another phrase, which has been supposed to be much more precise and intelligible.

Thus it is observed by Mr. Stewart, that the opinion we may happen to form with respect to this one expression (about touching the eyes) in Cheselden's account, can never affect the truth of that clause in which the author asserts, upon the evidence of his own observations, that "when his patient first saw, he was unable to form any judgment about distances." "The remainder of the sentence," adds Mr. Stewart, "is only a loose and unintelligible comment of the young man on this simple fact."

In reading this passage, it is scarcely possible not to see that Mr. Stewart mistakes the text for the comment. What the young man actually said was that all objects touched his eyes, and what Mr. Stewart styles "the simple fact," is

a comment upon this expression by Cheselden, who adduces it as proving that his patient could not judge of distances. Nothing can be plainer. "When he first saw," says the narrative, "he was so far from making any judgment of distances that he thought all objects whatever touched his eyes (as he expressed it), as what he felt did his skin."

In the next place, with all due deference to so able and cautious a philosopher, I cannot help considering what he designates a simple fact, but what is truly a comment or inference of the narrator, to be just as loosely stated as any thing else in the sentence; and if, instead of regarding it as a mere inference, we are to take it as a piece of independent testimony, nothing can be less satisfactory.

The phrase "making a judgment about distances" is ambiguous. "Making a judgment" is here equivalent to "forming a comparative estimate," and the expression may mean either forming a comparative estimate of two visible distances, or forming such an estimate of a visible and a tangible distance. In the one sense, the clause affirms that the patient was unable to see that objects were at different distances; in the other, that he was unable to

compare the distances of objects, as they appear to the eye, with those definite ideas of distance which he had acquired by the touch, and which he had been accustomed to term inches, feet, and yards; he was unable, namely, to tell that the object which he saw before him, at a certain visible distance, was at the precise distance known to him by touch under the appellation of a foot. This latter kind of ability it is evident he could not possess under any circumstances.

Even if he had been able to see objects with considerable precision to be at various distances, to note that one object seemed twice, and a second object thrice the distance of another; yet he would be at first quite incapable of telling whether the distance so doubled and tripled was the same as the tangible distance which he had been accustomed to term a foot, or a yard. In this sense he must have been truly unable to form any judgment about distances, and this was probably all that Cheselden would have been found to mean, had he been questioned on the point, and reduced to the necessity of attaching precise ideas to the language he was employing.

Such a supposition is the more probable be-

cause he makes use of the very same expression in regard to his patient's perception of figure. The boy, he tells us, could form no judgment of the shape of objects, which statement he afterwards enlarges; "He knew not the shape of any thing, nor any one thing from another, however different in shape or magnitude; but upon being told what things were, whose form he before knew from feeling, he would carefully observe that he might know them again; but having too many objects to learn at once, he forgot many of them; and (as he said) at first he learned to know, and again forgot, a thousand things in a day. One particular only, though it may appear trifling, I will relate. Having often forgot which was the cat, and which the dog, he was ashamed to ask; but catching the cat (which he knew by feeling), he was observed to look at her steadfastly, and then, setting her down, said, "So, puss, I shall know you another time."

Now it cannot be for a moment supposed that the expression, "he could form no judgment of the shape of objects," was intended to mean that all visible objects appeared to him of the same shape; all that was meant is, that the visible shape did not suggest to him the tangible shape,

nor consequently the name which he had been accustomed to give it. For it is obvious, that unless he had perceived objects to be of different forms by his sight, he could not have connected them with his ideas of tangible forms; he could not otherwise, for example, have associated his tactual notions of a cat with the visible appearances of the animal, an association which the last extract describes him in the very act of establishing. In order to make it possible to associate different sets of tactual impressions with different visible forms, those forms must antecedently be themselves *visibly* different.

If, then, by the expression, "he could form no judgment of the shape of objects," Cheselden could not mean, unless he laboured under great confusion of ideas, that all visible objects appeared to his patient of the same shape, we are entitled to infer that by the expression, "he could form no judgment of the distances of objects," he did not mean that all visible objects appeared to his patient at the same distance, but that the young man could form no judgment of the corresponding tangible distances.

The probable supposition is, that the writer himself had not in his mind any clear idea of

the import of his words, and was unaware of the ambiguity lurking in them; at all events his testimony cannot be admitted as vouching for any thing more as to his patient's inability to perceive distances than as to the boy's inability to distinguish shapes. In fact, however, his assertion on this point does not, when rigorously considered, amount to evidence; it stands merely as an inference drawn by himself from what the boy had said.

The ambiguousness of Cheselden's language is remarkably proved by the circumstance that Sir E. Home in a paper (hereafter to be examined) in the Philosophical Transactions, has actually taken his expressions concerning forms in the other sense, and asserts that Mr. Cheselden pointed out the fact, "*that vision alone gives no idea of the figure of objects,*" since the boy operated upon was unable, on recovering his sight, "*to distinguish the outline of any thing placed before him.*"

It is almost incredible that any one accustomed to reflection should have believed such an alleged fact to be possible. It shows how easily loose language gives rise to loose thinking. In saying this, I am not unmindful of Dr. Brown's ela-

borate argument, already examined, in favour of the same doctrine; but it has no reference to the expression in Cheselden's account, and can scarcely be regarded as any thing more than an ambitious trial of metaphysical ingenuity. What may be ingenuity in such a writer, may be sheer laxity of thought in another. The whole speculation is at once overthrown by the self-evident truth already stated, that it is impossible to associate different tactual impressions with visible forms unless antecedently to the connection, such forms are themselves visibly different.

These observations sufficiently show that, contrary to the general opinion, Cheselden's narrative does not furnish us with any decisive evidence that all things appeared at first to his patient to be at the same distance; and even if it had done this, it would be utterly inadequate to prove the truth of Berkeley's theory.

Even if we allow the boy's meaning to have been, that he apprehended all visible objects to be equally close to him, yet when we consider the effect likely to be produced by such a constant activity of the sense of touch, and total inertness of the sense of sight, as were his lot from birth, instead of that development and exercise of the sight first, and the touch afterwards,

which usually take place, what weight can it lend to the hypothesis of Berkeley?

The fact, that under such unnatural circumstances he had felt a momentary impression that all objects appeared to his new sense at one uniform distance, even if it were incontestably substantiated, would be quite insufficient to prove that such is the natural impression when the two senses are developed at their regular periods. It would rather indicate disorder and irregularity of function in some part of the visual apparatus including the brain, accruing from the long-continued inactivity of the organ. How could we possibly judge of the regular action of the muscles of a limb tied up in total inactivity since the hour of birth, from the first ineffectual efforts after its liberation from constraint?

"The eye newly couched," as a recent writer well remarks, "is not a sound eye instantly, nor do the muscles and various parts which had lain dormant for thirty years, act with perfect effect at the first attempt, after the irritation and torment of a painful operation; and even admitting that the eye was perfectly sound, the internal organs which perceive distance are not so. By disuse every part of the body be-

comes unfitted for the due performance of its functions *."

But this is an argument we can afford to waive. A much more important consideration remains. In the whole of this celebrated narrative there is nothing from which we can learn or infer — not a whisper of evidence to prove — that the boy's subsequent perceptions of visible distance had been acquired *by means of the touch.* Respecting this important point, there is an absolute silence. Admitting, for the sake of argument, that when he began to see, all objects appeared to him in the same plane; what is there to show that the various figures depicted on this surface did not separate themselves by degrees into discernibly solid bodies, assuming greater or smaller distances, as he continued to look at them, without any aid from his other senses; just as a combination of various sounds poured at once on the ear, although heard at first as one confused noise, would gradually separate as we continued to listen, into elements audibly distinct?

* A System of Phrenology, by Geo. Combe, 4th edit., vol. ii, p. 456.

SECTION IV.

CONTINUATION OF THE SUBJECT: CASE OF WM. STIFF, RELATED BY SIR E. HOME.

The next case we have to examine, and the only case which agrees with that of Cheselden in the circumstance that the patient spoke of objects touching his eyes, is contained in a paper by the late Sir Everard Home, read before the Royal Society, January 15, 1807 *.

The patient's name was William Stiff; he was twelve years old, and had had cataracts on both eyes from birth. *Previous to the operation* it was ascertained that he could distinguish the light of the sun from that of a fire or candle: the sun appeared the size of his hat, the candle-flame larger than his finger, and smaller than his arm. The sun, moreover, appeared to touch his eye. When a lighted candle was nearer than twelve inches, he said it touched his eyes; further off it did not; and at twenty-two inches it was invisible. On the 21st of July the extraction of the crystalline lens was performed on the left eye. The light was distressing to him.

* Philosophical Transactions, 1807.

"After allowing the eye-lids to remain closed for a few minutes, and then opening them, the pupil appeared clear, but he could not bear exposure to light. On my asking him what he had seen, he said, 'your head, which seemed to touch my eye;' but he could not tell its shape." On the 22d, "the light was less offensive.' He said he saw my head, which touched his eye." On the 23d, "he said he could see several gentlemen round him, but could not describe their figure. My face, while I was looking at his eye, he said was round and red."

Afterwards, from the state of the eye, no experiments could be made. On the 16th of September, the right eye was couched. The eyes were not examined with respect to their vision till the 13th of October, when the *light was not distressing* to him, and he could readily discern a white, red, or yellow colour. Objects *did not now seem to touch his eyes*, but appeared at a short distance. His vision was imperfect. The distance at which he saw best was five inches. When the object was of a bright colour, and illuminated by a strong light, he could make out that it was flat and broad; and when one corner of a square substance was pointed out to him, he saw it, and could find out the

other which was at the end of the same side. When the four corners of a white card were pointed out, and he had examined them, he seemed to know them; but when the opposite, yellow side, was placed before him he could not tell whether it had corners or not.

This case, as narrated by the operator, presents the most remarkable phenomena ever recorded in the instance of a blind person, and if they could be considered as correctly detailed, they would establish the fact of an instinctive correspondence between the sensations of touch and sight; or, more correctly speaking, they would prove the existence of an intuitive power to estimate the comparative magnitudes of a visible and of a tangible object, prior to experience.

The boy, before the operation, is represented as saying that the sun appeared the size of his hat. Now, as he is described as being able to see not opaque but only luminous bodies, this was in fact comparing the size of an object which he saw but could not touch, with the size of an object which he touched but could not see — the size of a visible intangible object (the sun), with the size of a tangible invisible object (his hat). Of the connection between visible and tangible qualities he could, according

to the account, have had no experience. The only two objects, the sun and the flame of a candle, which he is represented as seeing in any thing like a definite form, are objects the shape of which he could not ascertain by touch; and all the objects he could touch, with the perception of a definite form, were such as he was precluded from seeing. How then could he (as represented) compare his perceptions of visible magnitude with those of tangible magnitude, without a common object or medium? If we are to consider the facts as fully and correctly stated, the only conclusion we can come to is, that there is an instinctive power of comparing a visible magnitude with a tangible magnitude independently of experiencing their actual connection; a power of appreciating magnitude abstractedly.

From the difficulty here pointed out, perhaps we shall be warranted in supposing some imperfection in the account, and that the boy's power of vision was greater than the report states it to have been. The comparison he drew was, probably, owing to the interception of the light of the sun when he held his hat before his eyes. He could see the light of the sun, we are told, which would most likely appear

round, although with no very definite outline, and he would of course be sensible of any opaque body intercepting the brightness. A certain expanse before him when his eyes were turned to the sun would seem bright, or as he called it, red: on holding his hat before his eyes this bright expanse would be eclipsed, and he might therefore infer that the bright object and the body which eclipsed it were of the same magnitude.

Whatever explanation we adopt, one thing is clear, *viz.* that before the operation he must have had some perception of visible form and magnitude, and of their connection with tangible form and magnitude. He had some notion, for instance, how a circular object looked as well as how it felt, and these ideas would be joined together in his understanding by the common term *round*.

But the circumstances in which our inquiry is most interested are, that before the operation the sun appeared to touch his eyes; that a lighted candle appeared to touch his eyes when it was within twelve inches; that it did not appear to touch when further off; and that at twenty-two inches it was invisible.

Here, then, it is in evidence that he could dis-

cern an object at two different distances; he could perceive by sight that at one time the object was in contact with his eye, at another not. If we take the narrative literally, the perception of visible distance was quite familiar to him before the operation, and the result of the operation could not be either to give it or take away.

When he declared that Mr. Home's head appeared to touch his eye, he must have used the expression in the same sense as when he applied it before to the sun or the candle; and, as in the case of the candle, we are told that he was sensible when it was removed to a greater distance by its ceasing to touch his eye, we ought to have been informed whether the whole head, with all its irregularities, thus seemed to touch, or only some part of it; also, at what distance it ceased to be perceived in contact; and how the other objects appeared, which must have been pictured on his retina at the same time. Taking this very imperfect account, however, as it is, in all its meagreness, let us inquire what the boy intended to indicate, or what sensation the phrase was employed to denote.

A feeling of contact could not possibly, as already demonstrated, belong to the sight. The

expression, consequently, both before and after the operation, must have had reference to the sense of touch. At the latter period, it was doubtless one of pain from the admission of light, but before the operation it was probably a sensation of warmth, which would be felt locally like pain on turning the eyes to the sun, or looking at the flame of a candle placed within certain limits. On this supposition, when the candle was removed beyond those limits, the feeling would necessarily cease, which is in exact accordance with the narrative.

This view of the subject is strikingly confirmed by what is stated of the boy's feelings on the 13th of October, when his eyes were first examined as to their vision after the couching of the right eye. At that time, which was twenty-seven days subsequent to the operation, *the light was not distressing to him;* and objects, it is stated, *did not now appear to touch his eyes.* The pain from the admission of light, and the sensation of contact with visible objects thus vanishing together, forms a strong presumption that they were identical.

On the whole, this instance has even less in it than that of Cheselden in favour of Berkeley's theory. The incident usually considered as most

favourable to that theory, namely the declaration of the patient that the head of his surgical attendant touched his eye, cannot, in the nature of the case, prove any thing as to his visual perceptions; and whatever construction may be put upon the phrase, it seems marvellous that it should ever have been regarded as evidence that all objects appeared to him at the same distance.

But even if this latter point had been fully and unequivocally attested, still the narrative would have been as wanting in the main requisite as it is at present: like that of Cheselden, it contains no evidence whatever that the boy's perceptions of visible distance were subsequently acquired through the instrumentality of the touch. Supposing him to have commenced his intercourse with the visible world by perceiving only a party-coloured plane, as it has been termed, we are without any evidence to show that the superficial appearances on this plane assumed different stations and cleared up into distinct objects more or less remote, in consequence of his touching them with his hands, and not in consequence of the natural powers of the visual organ itself gradually awakening into full operation.

So far, indeed, is the evidence from proving this, that on the 23d of July, only two days after

the first operation, the boy is represented as seeing several gentlemen around him but not able to describe their figures; a representation implying that he already saw objects at various distances, although at that period his sight and his touch do not appear from the narrative to have been at all simultaneously exercised.

It may be remarked, in conclusion, that the very first question put to the patient only a few minutes after the extraction of the crystalline lens, and the record of the answer, are striking proofs of the vague manner in which evidence in these cases is taken. The boy affirmed, that he saw the surgeon's head, and yet we are told that he could not tell its shape. But if he knew the object to be a head, he must of necessity have known the shape, and therefore his inability to describe what he saw, was the same as any other boy of his years might possibly have manifested on being requested to describe in words so irregular a figure. Mr. Home, however, whose mind seems to have been preoccupied with the notion already commented upon, that vision alone gives no idea of the figure of objects, evidently regarded the circumstance as corroborating that doctrine.

SECTION V.

CONTINUATION OF THE SUBJECT: CASES RELATED BY WARE, HOME, AND WARDROP.

The two preceding cases, narrated by Cheselden and Home, are the only instances, as far as I can learn, on record, in which the patients restored to sight have declared that objects seemed to touch the eye, or used other expressions which could be interpreted as at all implying that objects appeared to their new faculty at one uniform distance.

The cases already adverted to, in which no such expressions were employed, but on the contrary language was used implying an immediate perception of all the three dimensions of space, are related by Home, Ware, and Wardrop.

Mr. Ware's patient was a boy seven years old (Master W—), and antecedently to the operation could distinguish colours when they were very strong and held close to the eye, but not forms *.

Mr. Home's patient, named John Salter, was of the same age, and was also capable of dis-

* Philosophical Transactions for 1801, p. 382.

tinguishing colours, which he did, we are told, with tolerable accuracy *.

After the operation on Master W—, the eye was bound up, and appears to have remained so during two days. On the second day he was standing near the fire, with a handkerchief tied loosely over his eyes, when he told his mother that under the handkerchief, which had slipped upward, he could distinguish the table, by the side of which she was sitting. It was about a yard and a half from him; and he observed that it was covered with a green cloth (which was really the case), and that it was a little further off than he was able to reach.

"Desirous," says Mr. Ware, "to ascertain whether he was able to distinguish objects, I held a letter before him at the distance of about twelve inches, when he told me after a short hesitation that it was a piece of paper; that it was square, which he knew by its corners, and that it was longer in one direction than it was in the other. On being desired to point to the corners, he did it with great precision, and readily carried his finger in the line of its longest diameter." After detailing several other

* Philosophical Transactions for 1807, p. 83.

experiments with similar results, Mr. Ware continues, "I held the objects at different distances from his eye, and inquired very particularly if he was sensible of any difference in their situation, which he always said he was, *informing me on every change, whether they were brought nearer to or carried further from it.*"

The evidence in the case of Mr. Home's patient, John Salter, shows similar results. After his eye had been couched it was allowed ten minutes to recover itself, and then a round piece of card, yellow, and one inch in diameter, was placed six inches from it. He said immediately it was yellow, and on being asked its shape, replied, "Let me touch it and I will tell you.' Being told he must not touch it, after looking for some time, he said it was round. A square and triangular piece he also called round. "The different colours of the objects placed before him he instantly decided on with great correctness, but *had no idea of their form.* He moved his eye to different distances; his focal distance was seven inches. He was asked, *whether the object seemed to touch his eye; he said, No! but when desired to say at what distance it was, he said he could not tell.*"

Two hours after the operation, the boy called

the different cards round; but upon being shown a square, and being asked if he could find any corners to it, he was very desirous of touching it. This being refused, he examined it for some time, and said at last that he had found a corner, and then readily counted the four corners of the square as well as those of a triangle, in doing which his eye went along the edge from corner to corner, naming them as he went along.

Both these instances are unfavourable to the Berkeleian theory. They are almost as decisive in their evidence regarding the intuitive perception of distance by the eye as any such instances can be reasonably expected to prove. Whatever faint perceptions of visible distance the patients may be supposed to have had previous to the operation, the readiness with which they immediately afterwards saw objects to be at some distance, or at various distances, goes far to show that this faculty was not acquired by the touch. This was particularly striking in the case of Master W—, who at once told whether objects were brought nearer or carried further from him.

They both also distinguished forms in a way that might have been antecedently expected, although Mr. Home, in the same page which

records instances of his patient's showing some power at least of discerning forms, pronounces that the boy had no idea of them. Hence the latter expression cannot be considered as indicating more than the patient's inability to call visible figures with uniform accuracy by their proper tactual names. Mr. Home also informs us that John Salter, when asked immediately after the operation at what distance an object was placed, could not tell. It is surprising that such a question was put to him. He could not possibly at that time have any other names for distances than such as, in his mind, designated merely tangible spaces. It was, therefore, asking him to tell the ratio which a visible quantity bore to a tangible quantity, prior to any experience of their connection, or to describe the former in terms expressive of the latter. He might as reasonably have been asked to name the distance in Coptic or Cherokee.

Mr. Stewart has attempted to weaken the effect of Mr. Ware's testimony, in the case of Master W—, by asserting that it proves too much*, and that the only inference which can with certainty be deduced from it is, that the

* Elements of the Philosophy of the Human Mind, p. 404, vol. iii.

patient saw too well before the operation to make his perceptions of any value for deciding the point in question. But Mr. Ware positively affirms that the boy at that time was unable to distinguish forms, and his power of perceiving colours appears to have been little, if at all, greater than that possessed by Cheselden's patient, as any one will be convinced of who compares the two accounts.

What is the most difficult part of Mr. Ware's statement to reconcile with our antecedent notions of probability is, that the boy should be able to tell not only the figures, and the greater or smaller distances of objects without the aid of the touch, but also the substance or material of which they consisted; pronouncing one object to be cloth and another paper. This difficulty, nevertheless, admits of being solved by supposing that the boy from hearsay, or from previous touch and sight, already knew the table to be covered with green cloth, and, therefore, when he saw the green colour, he would at once infer what was the substance.

In some similar way he would guess what were the other articles exhibited to him. Accustomed probably to handle letters, to be told they were composed of paper, and to see dimly

that they were white, and not perhaps having experienced the same combination of form and colour in any thing else; when a white four-cornered object was held up to his eye, he would naturally conjecture it to be a piece of paper or a letter.

But he could have no assistance of this kind to enable him to ascertain and describe the *forms* of the objects placed before his eyes, and to judge when they were brought nearer or removed further from him. These are acts which he could do only by the unassisted power of vision, and they alone are material to the purpose.

Those parts of the evidence which are the most difficult to account for, are such as do not affect our present inquiry.

Besides these two cases, detailed in the Philosophical Transactions, there is one very similar in its results, of which an account has been published in an independent form by Mr. Wardrop, and which has particularly attracted the attention of Mr. Dugald Stewart. The memoir is entitled, "History of James Mitchell, a Boy born Blind and Deaf, with an account of the Operation performed for the Recovery of his Sight, by James Wardrop, F.R.S.E."

In this instance there was necessarily some difficulty in estimating the degree of sight which he enjoyed previous to the operation, but from the appearances of disease in the eyes and other indications, Mr. Wardrop inferred that the boy could merely distinguish colours and differences in the intensity of light.

A similar difficulty would of course arise in appreciating the precise results of the acquisition of sight; and inasmuch as these circumstances may render the case less satisfactory and conclusive to readers in general, than the others already described, I shall advert only to a few particulars of Mr. Wardrop's narrative.

"When the operation was finished," says Mr. Wardrop, "he expressed great satisfaction; gazed around him, and appeared to distinguish objects." As it would have been prejudicial, however, to make experiments, his eye was covered up, and he was put to bed in a dark room. On the fourth day, a trial being made whether he could distinguish any object, he readily discovered a book, or any similar thing, placed on the coverlet of the bed; and in many of his attempts he seemed to judge pretty accurately of their distance. On the fifth day he evidently distinguished and attempted to touch

objects placed before him, judging pretty accurately of their distances. On the sixth day he amused himself with looking out of the window, seeming to observe the carriages passing. When a shilling was put on the middle of a table he instantly laid his hand upon it. Other details similar in character are given in the account.

"Of these very valuable facts," says Mr. Stewart, "Mr. Wardrop has left us to form our own judgment. To myself, I must own that, due allowance being made, first, for the visual *sensations* which were familiar to the patient from his infancy; and, secondly, for the intimate and accurate acquaintance which he had acquired of things external, by a comparison of the sensations of *smell* and of *touch*, the result appears, on the whole, as favourable as could reasonably have been expected to the Berkeleian theory of vision. Nor am I able to observe a single circumstance of any importance, which is not perfectly reconcilable with the *general tenor* of Cheselden's narrative*."

After all the considerations which have been brought before the reader in the present essay,

* Elements of Philosophy, vol. iii, p. 412.

he will, I suspect, be inclined to draw a very different conclusion, and to agree with me that the result appears as *un*favourable as it could well be to the Berkeleian theory. It is difficult to conceive how, with such necessary imperfection in the evidence, it could have been more so. As soon as the boy was tried, he readily discovered objects placed before him, and in many of his attempts to touch them, *seemed to judge pretty accurately of their distances.* The experiment could not have been more decidedly contradictory of Berkeley's theory, except in appearance, even had the attempts been completely successful; when, instead of its being recorded that he judged pretty accurately of distances, the statement would have been that he judged *quite accurately.* As to the difference between Cheselden's narrative and the one before us, I think the tenor of both when properly interpreted is the same; but ostensibly the two accounts are discordant on the main point, the former testifying that the patient could form no judgment of distances, the latter asserting that the boy Mitchell seemed to form a pretty accurate judgment of distances the moment he was tried. To my own mind, Mr. Wardrop's account presents evidence little less than irre-

sistible, that the human eye has a natural and original faculty of perceiving objects to be at different distances, and space to extend in every direction.

SECTION VI.

CONTINUATION OF THE SUBJECT: CASE OF A LADY RELATED BY MR. WARDROP.

By far the most interesting and important case in its bearings on the question before us is another more recently detailed by Mr. Wardrop, and published in the Philosophical Transactions*: "the case of a lady born blind, who received sight at an advanced age by the formation of an artificial pupil."

It is preeminently important, because, as Mr. Wardrop observes, "the blindness was more complete, and the period at which vision was acquired was much later in life than in any instance which has hitherto been recorded."

When the patient was about six months old, a Parisian oculist performed an operation on both her eyes. The operation on the right eye caused

* Phil. Trans., 1826, p. 529.

a complete destruction of the organ of vision; that on the left, although it was not followed by any alteration in the size and form of the globe, was equally unsuccessful in imparting sight.

"From that early period she had continued totally blind, being able merely to distinguish a very light from a very dark room, but without having the power to perceive even the situation of the window through which the light entered; though in sunshine or in bright moonlight she knew the direction from whence the light emanated." Subsequently Mr. Wardrop tells us, in direct terms, that she could not perceive objects, and had not any notion of colours. When she was placed under his care she was in her forty-sixth year. Under the impression that the retina of the left eye was sound, Mr. Wardrop thought that the restoration of her sight by making an artificial pupil was practicable. He accordingly performed three operations on the eye. After the first operation, which took place on the 26th of January, she said she could distinguish more light, but she could perceive neither forms nor colours. On the 8th of February, a second operation was performed, after which the light became offensive to her; she complained of its brightness, and was frequently observed trying

to see her hands; but it was evident her vision was very imperfect, from some opaque matter still obstructing the entrance of light. On the 17th of February, a third operation took place at Mr. Wardrop's house, whence the lady returned home in a carriage with her eye covered only with a loose piece of silk, and the first thing she noticed was a hackney-coach passing, when she exclaimed, "What is that large thing that has passed by us?" In the course of the evening she requested her brother to show her his watch, concerning which she expressed much curiosity, and she looked at it a considerable time, holding it close to her eye. She was asked what she saw, and she said there was a dark and a bright side, she pointed to the hour of twelve and smiled. Her brother asked her if she saw any thing more? she replied, "Yes," and pointed to the hour of six, and to the hands of the watch. She then looked at the chain and seals, and observed that one of the seals was bright.

On the sixth day she saw better than before, "but I cannot," she said, "tell what I do see; I am quite stupid." "She seemed indeed bewildered," observes Mr. Wardrop, "from not being able to combine the knowledge acquired by the senses of touch and sight, and felt disappointed in not having the power of distinguishing

at once by her eye objects which she could so readily distinguish from one another by feeling them."

On the ninth day she said to her brother, "I see you very well to-day," and came up to him and shook hands.

It is unnecessary to repeat more of the details. Eighteen days after the last operation Mr. Wardrop attempted to ascertain her precise notions of the colour, size, forms, motions, and distances of external objects. The principal results of this investigation may be summed up as follows:

1. She was sensible of different impressions from different colours, and easily learnt their names.

2. She distinguished a large from a small object when both were held up before her for comparison.

3. She saw different forms in objects shown to her.

4. She distinguished position as *above* and *below.*

5. She could perceive motion, and could discern *when an object was removed to a greater distance.*

6. She had considerable difficulty in directing her eye to any object she wished to examine.

7. "She seemed to have the greatest difficulty

in finding out the distance of any object, for when an object was held close to her eye, she would search for it by stretching her hand far beyond its position, while on other occasions she groped close to her own face for a thing far removed from her."

8. "She had yet acquired by the use of her sight but very little knowledge of any forms, and was unable to apply the information gained by this new sense, and to compare it with what she had been accustomed to acquire by her sense of touch. When, therefore, the experiment was made of giving her a silver pencil-case and a large key to examine with her hands, she discriminated and knew each distinctly; but when they were placed on the table, side by side, though she distinguished each with her eye, yet she could not tell which was the pencil-case and which the key."

In all these respects the case of this lady presents exactly such phenomena as any one might have antecedently expected, on careful and accurate reflection, from the sudden acquisition of sight by a human being of mature age, who had been completely blind from birth. She discerned immediately differences of colour, of size, of form, of position, of distance—facts of

which some are utterly inconsistent with the Berkeleian theory, and none in its favour.

On the other hand, she had a difficulty in directing her eye to objects, and in associating her ideas of tangible forms and distances with visible appearances. The first difficulty naturally arose from long disuse of the muscles employed in guiding the organ of sight. The difficulty of establishing an association between the visible distances as well as forms of objects, and their tangible distances and properties (in which respect the lady differed very much from the two boys operated upon by Ware and Home) is perhaps mainly attributable to the same cause which renders it a hard task for old people to acquire a new language, even though they hear it continually spoken, while their children make the acquisition with ease and rapidity; namely, a growing inertness in the recollection of novel things in minds not only rendered by years unapt for new operations, but already preoccupied with ideas which have been accumulating through a long life.

In the statements respecting her perceptions of distance, as we are told that she could perceive when an object was removed farther off, but had the greatest difficulty in finding out the

distance of an object so as to place her hand upon it, there may seem to be at first sight a little discrepancy. Every one, nevertheless, must discern, on reflection, that while the former circumstance proves that she saw different distances, the latter only shows her inability to combine her tactual ideas with her visual perceptions and adjust her muscular efforts accordingly.

It will not have escaped the attentive reader that she easily recollected the names of colours, which may be accounted for by the vividness of the sensations and the fewness of their names, and perhaps also by their being altogether unconnected with tactual impressions. In regarding a colour, in order to learn the name, she would have only to associate the colour with an unpreoccupied although familiar word, but in regarding the form of an object, in order to learn its name, she would have to associate the visible form with a word already engrossed by familiar tangible qualities. The consequence of this difference in the two cases would be, that when she heard the name of the colour, the colour would be the only recollection that could be awakened by it; but when she heard the name of the form, the tangible properties would be the first to occur to the mind, and probably to the exclusion of the

visible figure. Without attaching much importance to this circumstance as an impediment in her way, the reader may perhaps regard it as deserving notice. A more material circumstance contributing to the difficulty of establishing the requisite associations is, that the lady would at first see a great many more objects than she could touch or handle, and hence she would be apt to feel confused and oppressed. She would be curious to know what they were, attempt to guess, and be frequently baffled, a process, the repetition of which is generally succeeded by a sense of stupidity.

Again, if her friends told her the names of objects which she could not touch, she would have to make an effort (difficult, doubtless, from its novelty) to combine the ideas of tangible properties with the visible forms before her.

Her mind would therefore be for some time in this state: she would know a number of visible objects from having touched and handled them, others she would know solely from having been informed of their names; a larger number she would see as merely visible objects, without knowing their names or what tangible properties were combined with their forms and colours; and yet, even amongst the last, there would be parts un-

avoidably suggesting conjectures as to the nature of the objects to which they belonged.

It is not surprising, then, that time should be required to clear up this confusion, and to reduce the whole to proper order, and that meanwhile she should often feel perplexed and bewildered. Nor is it wonderful that a person of mature age, with a mind full of precise and familiar tangible ideas, and with all the organs belonging to vision weakened and stiffened by sheer disuse, should be slow in associating new impressions with long acquired conceptions, when compared with boys of tender years and scantily furnished memories.

SECTION VII.

FURTHER REFLECTIONS ON THE PRECEDING CASES.

On a review of these instances of restored vision, it appears that with the exception of the employment of a single expression, in two of the cases, all the circumstances detailed are either unfavourable to the hypothesis of Berkeley, respecting the original perceptions of sight, or incapable of yielding it support. With regard to the expres-

sion alluded to, which has been supposed to imply the appearance of all objects at a uniform distance, it has been shown to be either absurd, or employed to denote a sensation of touch, and thus to be utterly incompetent to furnish the inference deduced from it.

And if we even allowed it to possess all the weight which it has been assumed to carry, the evidence which these cases present, being contrary in its tendency to the evidence furnished by the rest, could not suffice for the support of any general conclusion. The state of the question would then be, that in two of the instances of restored vision, objects appeared at one uniform distance; in the other instances, objects appeared at various degrees of proximity, thus establishing the grand fact, that distances can be perceived by the eye; and the former mode of perception or aspect of objects might be reasonably attributed to some peculiarity of circumstances or idiosyncrasy. In reality, however, the ambiguity of the language and the vagueness of the testimony relieve us from the necessity of resorting to any such hypothetical explanation.

Finally, there is the decisive consideration, that the two cases in question are silent with respect to the acquisition of perceptions of visible

distance and solidity through the instrumentality of any other sense; they furnish no evidence whatever that the visual discernment of all the three dimensions of space, unequivocally manifested by the patients very soon after the operations performed upon them, was at all owing to the assistance of the touch and not ascribable to the natural discrimination of the sight, growing and strengthening with exercise.

In reflecting upon these interesting accounts of the removal of blindness, it is impossible not to regret that some of their able authors had not more distinctly conceived the precise points to be ascertained in order to put the theory of Berkeley to the test. But, as Diderot long ago remarked, "Preparer et interroger un aveugle né, n'eût point été une occupation indigne des talens réunis de Newton, Descartes, Locke, et Leibnitz."

In regard to distance, the chief desideratum was not to ascertain either whether the patient could lay his hand on any object placed before him, or whether he could judge at what distance the object was situated. The former is doubtless a point worthy of strict inquiry, but it relates chiefly to the question whether there

is any natural adjustment of the muscular movements to the perceptions of sight; and although the capacity of effecting this adjustment at once with precision, shows (as amongst the lower animals), that distance is perceived by the eye, yet utter inability to do it would by no means prove the contrary in a person newly couched, since the natural faculty in question might have been lost by disuse, or rendered impotent by the habit of adjusting the muscles to the impressions of other senses; and the discernment of different distances, moreover, might exist without being all at once sufficiently precise to regulate muscular movements. It is easy, indeed, to see that if the power of adapting with precision the motions of the body to the perceptions of sight were instinctive, as we have every reason to believe, it must still, in such cases of restored sight, be necessarily deranged by the antecedent inactivity of the visual organs on the one hand, and, on the other, by the habit superinduced upon the muscular system, of acting not only without their co-operation or direction, but under different guidance.

With respect to the second point, namely, ascertaining whether the patient was able to judge at what distance any object was placed,

much confusion, as already explained, seems to have existed in the minds of some of the operators as to what this phrase implies. To ask a patient to tell the distance of an object, as seems in several instances to have been done, was, in reality, asking him to solve, *à priori*, a problem of which nothing but experience could furnish the solution; namely, to assign the ratio of a visible space to a tangible space, or, in different words, to designate a visible space by a term which, in his mind, could denote only the relative place which a portion of tangible extension held amongst other portions of tangible extension. To a man newly endowed with sight, the words "inch," "foot," and "yard," are just such terms as here described; and the question put to the patient was doubtless intended to elicit an answer expressed in similar tactual phraseology.

If we suppose, even, that the question put to the patient was intended simply to ascertain whether he could distinguish the ratio between one visible distance and another, it was setting him a task which he could not be expected to achieve; and his inability to do it, would not furnish the shadow of an inference against his power of seeing the third dimension of space.

A person gifted with sight, but deprived of tactual perception from birth, if suddenly *restored to touch*, would experience a precisely similar difficulty: he would find himself incapable at first of comparing his tactual perceptions of extension amongst themselves, so as to describe with any exactness the ratio of one tangible space to another.

The points just adverted to were not then the principal matters to be ascertained. The truly important point, as far as Berkeley's theory is concerned, was whether two or more different distances were seen to be different, without reference either to the power of estimating their ratio to each other, or to the capability of adjusting the action of the muscles to such visual perceptions.

Two modes of putting this to the test present themselves, both of which ought to be employed. One is to take an object and place it successively at various distances from the patient. It is obvious, that if he can tell when it approaches and when it recedes, he can perceive distances by his sight. This experiment was distinctly made by Mr. Ware, as we have seen, and he testifies that his patient informed him at every change in the proximity of an object, whether

it was brought nearer to his eye or carried further from it. It is an experiment conclusive in itself, even if the affirmative answer which it yields should not be corroborated by the result of any other experiments.

The other mode of trying the question is, either to place several objects at once before the patient at different distances, and ascertain from him whether they appear to be so; or to substitute a single solid object and ascertain whether he sees it in relief. If such an experiment, properly varied, so as to prevent error and misapprehension on either side, were made, the result would manifestly determine the existence or non-existence of a power in the patient of visually perceiving the third dimension of space.

A careful and express experiment of this kind seems not to have been instituted by any of the gentlemen whose narratives have been cited. That objects were actually before the patients at different distances, and seen to be so is, indeed, indirectly attested by their accounts, but no simple and direct trial in the way here pointed out was purposely made; nor does any one appear to have dreamed of asking whether solid objects were seen in relief.

The experiments, in regard to the perception of form, were made with somewhat more precision;

but even here the most obviously conclusive ones were occasionally omitted. Mr. Home, as we have seen, held a circular piece of card (ten minutes after the operation), before the boy, John Salter, who, after looking at it for some time, said it was round. He afterwards called both a square and a triangular piece round; but it does not appear from the narrative that a circular and a square piece were, at that time, placed before him together, and an inquiry made whether they appeared alike or different — which was plainly the most obvious and direct experiment that could be devised to prove whether, or not, he had an immediate perception of visible figure. This, nevertheless, was afterwards done, and the discernment of different visible forms clearly ascertained.

Whether he could give the different forms their proper tactual names was altogether another question. On trial, however, both he and other of the patients accomplished this with regard to simple figures; and thus, in fact, solved the problem proposed by Mr. Molyneux to Mr. Locke nearly one hundred and fifty years ago, in the following terms: —

"Suppose a man born blind, and now adult, and taught by his touch to distinguish between a cube and a sphere (suppose) of ivory, nighly

of the same bigness, so as to tell when he felt one and t'other, which is the cube, which the sphere. Suppose then the cube and sphere placed on a table, and the blind man to be made to see; query, 'Whether by his sight before he touched them, he could now distinguish and tell, which is the globe, which the cube?' I answer not; for although he has obtained the experience of how a globe and how a cube affects his touch; yet he has not yet attained the experience, that what affects his touch so or so, must affect his sight so or so; or that a protuberant angle in the cube, that pressed his hand unequally, shall appear to his eye as it does in the cube *."

Locke, in the second book of his Essay, having introduced the substance of this passage from Molyneux's letter, adds, "I agree with this thinking gentleman, whom I am proud to call my friend, in his answer to this his problem; and am of opinion that the blind man, at first sight, would not be able with certainty to say which was the globe, which the cube, while he only saw them; though he could unerringly name them by his touch, and certainly dis-

* Letter from Molyneux to Locke. — Locke's Works, vol. viii, p. 311.

tinguish them by the difference of their figures felt *."

It is surprising that these two philosophers should have answered the question so absolutely in the negative. If we admit, as Locke does in the very section where this passage occurs, that the eye naturally distinguishes plane figures, it follows that it can discern the relative positions of lines; it can consequently perceive angles and curves in all their variety. The touch can do the same. There are, then, relations existing between lines, which both these senses are capable of perceiving. The identity of form, therefore, between a visible right angle, and a tangible right angle might be recognized, although these two objects had never been simultaneously perceived.

The quickness with which it would be recognized, in the case of a blind person suddenly endowed with sight, would doubtless vary with circumstances †. A mathematician would instantly be sensible of it, while an uncultivated

* Essay, book ii, chap. ix, § 8.

† For some acute and instructive remarks on Molyneux's problem the reader is referred to Diderot's celebrated "Lettre sur les Aveugles, à l'usage de ceux qui voyent." See his Œuvres Completes, tome ii, p. 158 et seq. London, 1755.

peasant might slowly awake to the discernment of the same fact. Something would depend on natural sagacity, and still more on the familiarity of the patient with the tangible forms which were the subjects of the experiment, and on the habit of attending to the distinctions amongst them. A confirmation of these remarks is furnished by almost every detail in the cases of restored vision already cited. Take, for example, the evidence of Mr. Home in regard to John Salter. This boy, only seven years old, found out the corners of a square without the assistance of his touch when he had been in possession of his sight no more than two hours; but he could not make out the figure all at once, it was a work of some little time and examination. On occasions of several subsequent experiments (thirteen days later) with cards of various shapes, in which the boy ran his eye along the outline of the objects before he told their forms, Mr. Home remarks, "The reason of his making so slow a progress was, that these figures had never been subject to examination by touch, and were unlike any thing he was accustomed to see."

It is obvious that the single circumstance of a boy, almost immediately after receiving his sight, being able to recognize a corner without the aid

of touch, is a conclusive solution of Molyneux's problem in the affirmative, and it is remarkable that the proposer of it himself seems to have placed the determination of the question on this very point, alleging as a reason for answering it in the negative, that the blind man could have had no experience how a tangible angle would look.

The same experiment is, in my opinion, decisive also of Berkeley's general doctrine on the subject, of which Molyneux's proposition may be considered as a particular exemplification.

"The extensions, figures, and motions perceived by sight, are specifically distinct," he contends, "from the ideas of touch called by the same names; nor is there any such thing as one idea, or kind of idea, common to both senses."

This doctrine appears to me to proceed from a confined view of the subject, an inadequate apprehension of those relations which are necessarily comprehended in the perception of external objects. We can scarcely open our eyes or use our hands without discerning resemblance and difference, antecedence and subsequence, and other relations in objects and events. Thus the relation of resemblance may be discerned in a thousand things; in two sounds, for example, or two scents, or two figures; but although the

correlatives may be different, the relation itself is manifestly in every case the same, and engenders the same feeling or state of mind in the percipient.

As a more particular illustration, suppose I draw a single black line an inch long on paper: I look at it, and at the same time I take in my hand a thin smooth slip of wood, about the same length. Here already I have several perceptions, or perceive several relations, common to both the senses employed, such as straightness, continuity, having two ends, or, as a German might say, two-endedness. I proceed to draw another line parallel to the first, and at the same time place two slips of wood parallel to each other, so that I can feel them without disturbing their relative position. Here besides perceiving the other relations already mentioned, I discern the relation of parallelism both by sight and by touch, and also that of number.

In this case, while I see colour which I cannot feel, and feel solidity or resistance which I cannot see, I also perceive parallelism connected in the one case with colour, and in the other with solidity. It is true, I am unable to perceive it or think of it but as connected with one or the other, but this makes no difference in the rela-

tion itself. Tangible parallelism and visible parallelism may be said to be compound objects, one of which is composed of tangibility and parallelism, the other of visibility and parallelism; in one of their component parts they have no resemblance, in the other they are perfectly alike.

To revert to the experiment which led to these remarks. The fact that the boy was able to recognize by sight a corner before he had had any experience to connect his visual with his tactual perceptions, could arise only from an intuitive apprehension of the sameness of the relation discerned by the eye with that discerned by the touch.

CHAPTER VI.

ON THE ORIGINALITY OF BERKELEY'S THEORY.

HAVING completed our review of the Essay towards a New Theory of Vision, we shall be in a condition to appreciate the degree of originality which it possesses. A philosophical speculation of this elaborate kind, seldom arises in the mind of any individual unprompted by something in the writings of his predecessors. Traces of similar thoughts, less firmly grasped and less decisively expressed, may usually be found in earlier works; and they are interesting and instructive because they not only enable us to mark the gradual progress of ideas in the minds of successive thinkers, but help us to understand the theory in its maturest form.

Such precursory indications of Berkeley's theory in the works of several writers have been cited by Mr. Stewart in his Dissertation on the Progress of Metaphysical Philosophy. To what extent these were known to the ingenious author,

and had a share in suggesting the subtile speculations of his celebrated essay, cannot now be determined; for his biographers are, as far as I know, silent on the subject, and the treatise itself affords few direct intimations of the course of reading in which his mind had been previously engaged.

Mr. Stewart thinks it probable, that the observations of Malebranche on the estimation of distances were unknown to him, and it is equally probable that, of the writers named in the dissertation, Locke is the only one to whom he was indebted for any hints that were turned to profit in the Essay towards a New Theory of Vision.

In a work, however, by an English philosopher, of earlier date than the writings of either Locke or Malebranche, there is a remarkable passage respecting the perception of distance (unnoticed by Mr. Stewart) which might, possibly at least, have had some part in exciting Berkeley's attention to the subject, and modifying his train of thought. I allude to Glanvill's Scepsis Scientifica, a treatise deservedly praised by critics for its acuteness and originality. After some observations on the difficulty or impossibility of explaining how the immaterial soul

should be affected by mutations produced in matter, the author proceeds as follows:—

"Besides, how is it, and by what art doth it [the soul] read that such an image or stroke in matter (whether that of her vehicle or of the brain, the case is the same) signifies such an object? Did we learn an alphabet in our embryo state? And how comes it to pass, that we are not aware of any such congenite apprehensions? We know what we know, but do we know any more? *That by diversity of motions we should spell out figures, distances, magnitudes, colours, things not resembled by them; we must attribute to some secret deduction.* But what this deduction should be, or by what mediums this knowledge is advanced, is as dark as ignorance. One that hath not the knowledge of letters, may see the figures, but comprehends not the meaning included in them: an infant may hear the sounds, and see the motion of the lips; but hath no conception conveyed by them, not knowing what they are intended to signify. So our souls, though they might have perceived the motions and images themselves by simple sense, yet without some implicit inference it seems inconceivable how by that means they should apprehend their archetypes.

"Moreover, images and motions are in the brain, in a very inconsiderable latitude of space; and yet they represent the greatest magnitudes. The image of a hemisphere of the upper globe cannot be of a wider circumference than a wallnut: and how can such petty impressions notify such vastly expanded objects, but through some kind of scientifical method and geometry in the principle? *Without this it is not conceivable how distances should be perceived, but all objects would appear in a cluster, and lie in as narrow a room as their images take up in our scantier craniums.* Nor will the philosophy of the most ingenious Descartes help us out; for the striking of divers filaments of the brain, cannot well be supposed to represent distances, except some such kind of inference be allotted us in our faculties: the concession of which will only steed us as a refuge for ignorance; where we shall meet what we would seem to shun*."

* Scepsis Scientifica: or Confest Ignorance the way to Science; in an Essay on the Vanity of Dogmatizing, by Joseph Glanvill, M.A., p. 22. Mr. Hallam has quoted this passage in his Introduction to the Literature of Europe, vol. iv, p. 265, omitting, however, without any mark of discontinuity, the portion lying between the word "archetypes" (printed by him *antitypes*), and the words, "the striking of

Here, as the reader will observe, we have presented to us with great particularity Berkeley's favourite comparison (to be found also in Locke) of the process of seeing distances, figures, and magnitudes, to the interpretation of language. The two philosophers differ, however, in one point. Glanvill says, that our spelling out these distances, figures, and magnitudes, must be attributed to some secret deduction, congenite or natural, not acquired; while Berkeley ascribes it to experience. The doctrine of the former amounts in reality to the proposition, that the perception of such properties is intuitive. His "alphabet in our embryo state," "congenite apprehensions," "secret deduction," and "implicit inference," come to no more than what we now express by the term *intuition*. Both modes of expression may be severally charged, perhaps, with being "a refuge for ignorance;" but the latter has the advantage of stating the fact with the least admixture of hypothesis.

divers filaments." Mr. Hallam says, that Glanvill's book, of which two editions came out under different titles, is so scarce, particularly in its second form, as hardly to have been seen, perhaps, by six living persons. The present writer has reason, therefore, to think himself fortunate in possessing copies of both editions.

The last remark leads me to observe, that I have quoted the passage from the Scepsis Scientifica, scarcely more with a view to show that it might have had some influence on the train of ideas in Berkeley's mind, than in order to call the attention of the reader to the perspicuous statement, contained in it, of the ultimate difficulty which offers itself to our speculations, not only in the case of distances, but also of colours, and (although Glanvill does not say it) of impressions of touch as well as sight. In all these cases alike, we trace sensation or perception to an affection of the nerves and brain: there the physical process ends, and the next event we arrive at, in our investigation, is a mental effect. That the particular mental effect succeeding the affection of the optic nerve, should be a perception of distances, is no more unaccountable than that the particular mental effect succeeding an affection of the nerves of the arm, should be a perception of a solid body. By the term "unaccountable" thus used, we can in fact mean nothing more than that no phenomenon can be detected as intervening between the first event and the second, and it is almost needless to add, that what mental effect shall follow any given affection of the

nerves can be determined by nothing but experience.

It is Locke, however, who wrote about thirty years later than Granvill, to whom the principal credit is due of having laid the foundation of Berkeley's theory. In the passage quoted by Mr. Stewart *, he clearly lays down the propositions that when we have before our eyes a sphere of gold, marble, or other substance, we see only a flat circle variously shaded, and that the perception we frame to ourselves of a convex figure is a judgment or inference. He also teaches, that from the quickness with which the judgment in this and similar instances follows the sensation, we mistake it for an impression of the senses, and take little notice of the sensation by which it has been excited, just as when we are engaged in reading, we pay small attention to the words, but fix our minds on their signification.

All this has been literally adopted by Berkeley. But there is one important difference to be noted in Locke's exposition of the subject, compared with that of his successor. In describing how

* See Locke's Essay, book ii, chapter ix, sect. 8; and Stewart's Dissertation, p. 166.

we arrive at that knowledge of convexity in figure, which we, of course, must possess before we can judge that the plane circle before us is a sphere, he is silent respecting any assistance rendered by the touch; and it seems doubtful whether he did not conceive that, in some way or other, the sight attained the knowledge of convexity by its own unaided powers.

"When we set before our eyes," he says, "a round globe, of any uniform colour, *v. g.* gold, alabaster, or jet, it is certain that the idea thereby imprinted in our mind, is of a flat circle variously shadowed, with several degrees of light and brightness coming to our eyes. But we having by use been accustomed to perceive what kind of appearance convex bodies are wont to make in us, what alterations are made in the reflections of light by the difference of the *sensible figures* of bodies; the judgment presently, by an habitual custom, alters the appearances into their causes; so that, from that which is truly variety of shadow and colour, collecting the figure, it makes it pass for a mark of figure, and frames to itself the perception of a convex figure and a uniform colour; when the idea we receive from thence is only

a plane variously coloured, as is evident in painting *."

In this passage, if Locke had said *tangible* figures instead of *sensible* figures, the conformity of his views with those of Berkeley, would have been clear; but the probability is that he had not tangible figures in his mind. This supposition is countenanced by his classing together the perception of convexity of shape and that of uniformity of colour, and explaining them on the same principle. He represents the judgment as altering a figure variously shadowed, as we really see it, into a figure of uniform colour. Here the knowledge that the sphere is of a uniform colour (as it must be if made of a uniform material such as gold or jet), is obtained through the eye, and all our judging in the matter comes to this, that the immediate visible appearance of the sphere suggests what its visible appearance has been, or would be, in other circumstances, as for example, if we could see every part of it in the same light.

In the same manner Locke may have meant to say, that when we judge an apparently plane figure to be convex, it is in consequence of

* Locke's Essay, book ii, chap. ix, sect. 8.

having ascertained at some former period, by the sight, that the figure now apparently plane is in reality spherical. We may, for instance, have seen the sphere turned round on its axis, and thus viewed it on all sides. It is true, that if Locke meant this he cannot be regarded as philosophically consistent; but I, nevertheless, strongly suspect that the notion of *tangible* convexity being suggested by the visible plane figure, never entered his mind; for, he elsewhere * says, "we get the idea of space both by our sight and touch; which, I think, is so evident, that it would be as needless to go to prove that men perceive by their sight a distance between bodies of different colours, or between the parts of the same body, as that they see colours themselves: nor is it less obvious, that they can do so in the dark by feeling and touch."

Another remark may be made on Locke's statement. He takes as the basis of his whole representation, the gratuitous assumption, which he seems to have thought it needless to prove,

* Essay, book ii, chap. xiii. It is only fair to add that the introduction of Molyneux's problem, in connection with the passage last quoted, militates against the conjecture I have here hazarded. Locke's views on the point in question could not, at all events, have been very determinate.

that the idea imprinted in our mind, by the sight of a sphere, is that of a flat circle variously shaded, "as is evident," he adds, "in painting;" thus begging the whole question; or (if the latter expression must be considered as an argument), falling into the fallacy exposed in a preceding chapter, that objects of three dimensions must be seen to be plane, because plane objects may be made to appear as of three dimensions.

Berkeley, then, is indebted to Locke for the idea that our visual perceptions of the third dimension of space are (frequently at least) only judgments excited in our minds by plane figures — the sounder part of his plausible theory; but the explicit doctrine, with all its ingenious illustrations, that these judgments are only suggestions of tangible outness and extension, may be regarded as exclusively his own. It is in the development of this latter notion that he has displayed all the subtlety of his genius and the fertility of his invention. It is remarkable, however, that although he ascribes the whole of our perceptions of outness and distance to the experience derived from the sense of touch, yet he makes no mention of that sense till his 45th section, whence it happens, that to persons

reading his essay for the first time, his continual assertions through forty-four sections as to our visual perceptions of distance being the result of experience, are altogether enigmatical. Readers are constantly prompted to inquire, what is the kind of experience the author refers to; and it is not till they have suffered some perplexity, that they at length discover what ought to have been plainly stated at the commencement.

CHAPTER VII.

CONCLUSION.

In the preceding treatise I have endeavoured to give the ingenious Theory of Berkeley a close, comprehensive, and, I hope, candid examination. With this view, I have directed my attention, in the first place, to the phenomena of consciousness, on which Berkeley himself has almost exclusively dwelt, and have shown that they not only offer no support to his doctrine, but are wholly inconsistent with it.

In the next place, I have examined such phenomena as are external to the observer. The indications of vision presented by the lower animals, by infants, and by blind persons restored to sight, have been successively passed in review, and have all tended to prove the unsoundness of this celebrated hypothesis. Wherever I have sought for evidence the character of the testimony has been uniform; metaphysical investigation and physiological inquiry have given the same answer, and alike served to confirm the universal belief of

mankind in the direct visual perception of the three dimensions of space.

If these conclusions should be corroborated by strict investigation on the part of various competent inquirers, and appear as clear and correct to others as they do to the author; and if the theory of Berkeley should consequently fall, its general reception by philosophers heretofore must be considered as one of the most extraordinary circumstances to be found in the annals of speculative philosophy.

This general reception of it is undoubtedly a proof of the great ingenuity with which it is developed and maintained, and yet a close examination will scarcely fail to convince any one, that the Essay towards a New Theory of Vision is rather a clever mustering of plausible arguments, in support of a favourite notion, by a mind delighting in the exercise of its own subtlety, than a masterly exposition of the subject in hand, or a skilful arrangement of a train of ideas in their due logical order and dependence. It has little method, and abounds in repetition for want of it, while the author scarcely seems at all times sufficiently master of the impalpable and shadowy notions which he has called up, to escape confusion and perplexity.

That an hypothesis so insecurely founded, and so slightly although ingeniously supported, should have been so long regarded as valid, has probably arisen from the abstruseness of the subject, and the consequent disinclination of most people to think it out for themselves.

It is so much easier to adopt the reasonings and representations of an ingenious philosopher than to scrutinize them step by step, that when his doctrines are speciously maintained, when they are at the same time not concerned in any practical result, and when the correction of their errors depends rather on continuity and precision of thought and accuracy of deduction, than on physical investigation or experimental inquiry, it is not surprising that they are handed down unchallenged from one generation to another, and are, perhaps, at last arrested in their tranquil descent by some fortuitous circumstance which instigates an inquirer to question their soundness.

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